Appendix F

North Bend Gravel Operation
Plants and Animals
Technical Report

NORTH BEND GRAVEL OPERATION
PLANTS AND ANIMALS TECHNICAL REPORT

For

KING COUNTY & CADMAN, INC.
URS JOB NO.: 53-42779001.00
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1.0 INTRODUCTION

This technical report describes existing conditions and addresses the potential impacts to plants and animals from the proposed development of gravel extraction and processing operations in North Bend, Washington. Impacts were qualitatively assessed for four project alternatives.

1.1 STUDY AREA

The gravel mining operation is proposed to take place on land located east of North Bend, Washington, in unincorporated King County. The land is owned by Weyerhaeuser Company and leased to Cadman, Inc. The proposed mining would occur on two portions of the project site referred to as the "Upper Site" and "Lower Site." The two portions of the project site, connected by an operational easement that was retained as part of Weyerhaeuser Company's conveyance of intervening parcels pursuant to the 1998 Memorandum of Understanding, are a single, contiguous site for permitting purposes. The Lower Site is located north of I-90 and east of 468th Avenue SE. The Lower Site is about 115 acres. The Upper Site is located north of I-90 on the Grouse Ridge plateau, and is about 578 acres. The Upper Site is approximately 900 feet higher in elevation than the Lower Site.

The study area includes the project site (approximately 700 acres), the conveyor line connecting the two portions of the site and SE Grouse Ridge Road that provides access from the Upper Site to I-90 in Alternatives 3 and 4. The area studied extends east from 468th Avenue SE to the east end of the Grouse Ridge plateau near the Washington State Patrol Fire Training Academy, north to the Middle Fork and Lake Dorothy roads, and south to the South Fork of the Snoqualmie River.

1.2 METHODOLOGY

1.2.1 Fish and Wildlife Habitat

Information concerning threatened and endangered species and habitats was requested and received from the U.S. Fish and Wildlife Service (USFWS), the Washington State Department of Fish and Wildlife (WDFW), and the Washington Natural Heritage Program (WNHP). These reply letters are included in Attachment A of this report. A literature review of the study area was conducted and biologists from WDFW, Washington Department of Natural Resources (WDNR) and King County were interviewed by phone.

URS wildlife biologists conducted site-specific biological resource investigations from March through June 1999, and in December 2000, February 2001, and April 2001. Biologists walked the study area to describe existing vegetation cover types and habitats and to look for evidence of use of the area by any wildlife. Aerial photographs (Janikowski Oost & Associates, March 7, 2000) were used to identify vegetation cover types in the proposed project area and to prepare a cover type map of existing conditions. The study area was revisited to ground truth what was identified in the aerial photographs and to document the cover types with photographs.

A URS fisheries biologist surveyed all streams within the project sites and along SE Grouse Ridge Road. Stream flows were estimated at road crossings through the use of depth measurements and a flow meter.

A backpack electrofisher was used to survey streams upstream from the last visual observation of fish and to identify the species of fish present. The survey met the state guidelines for determining fish use for the purpose of typing waters under WAC 222-16-030.

Species observed during field surveys and species likely to be found in the proposed project area are reviewed in Section 2.4, Potentially Affected Fish and Wildlife Species. Status species and habitats listed in USFWS, WDFW, and WNHP correspondence letters are included in Section 2.5, Threatened and Endangered Species. The field survey findings for each listed species are covered individually. Streams draining off Grouse Ridge have been mapped using GIS data and aerial photographs and field observations.

1.2.2 Wetlands

Wetland determination and delineation methods are outlined in detail in Attachment D, Wetland Delineation Report. Delineation methods differ from reconnaissance methods in the level of analysis performed. A wetland reconnaissance is defined as an investigation to estimate the location and extent of potential wetlands. Reconnaissance methods involve a survey of the entire study area noting brief characterizations of vegetation, soils and possible wetland hydrology. Wetland determinations made during a reconnaissance level investigation are subject to change upon conducting a wetland delineation. A wetland delineation allows the opportunity to return to areas identified as potential wetlands in the reconnaissance visit and scrutinize the vegetation, soils and hydrologic regime. During a delineation, sample plots are placed in areas identified as wetlands in the reconnaissance. In a sample plot, dominant vegetation is quantified, the soil is surveyed for hydric features, and the area is inspected for indicators of wetland hydrology. If the sample plot is dominated by wetland vegetation, has hydric soils and contains sufficient indicators of wetland hydrology, the area is determined to be wetland.

2.0 AFFECTED ENVIRONMENT

2.1 WILDLIFE HABITAT

Habitats are shown in the cover type map (Figures 1A to 1D). Almost all of the proposed project area is commercial conifer forest in various stages of regeneration. Small pockets of other cover types such as bare mined areas, riparian areas and mature forest are also present.

2.1.1 Conifer Forest

The conifer forest communities found at the site are young second or third generation dominated by Douglas-fir (*Pseudotsuga menziesii*) trees. Private timber companies have managed these communities for timber production. This conifer forest is the most widespread of the habitats found on site. Other trees in these forest stands include western red cedar (*Thuja plicata*), western hemlock (*Tsuga heterophylla*), and grand fir (*Abies grandis*). The canopy is closed, and the understory is sparse. The habitat is basically two layered with the tree canopy and a depauperate understory herb and low shrub layer. Dominant understory plants include sword fern (*Polystichum munitum*), salal (*Gaultheria shallon*), Oregon grape (*Mahonia nervosa*), lady fern (*Athyrium filix-femina*), deer fern (*Blechnum spicant*), red huckleberry (*Vaccinium parvifolium*), trailing blackberry (*Rubus ursinus*), salmonberry (*Rubus*

spectabilis), and vine maple (*Acer circinatum*). Conifer forests have been mapped according to different stages of regeneration subsequent to commercial harvest.

For the purposes of a cover type analysis of the proposed project area, the stages are identified as seedling shrub, sapling, pole, early mature and mature/old-growth. Figures 2A and 2B include photographs of the vegetation cover types.

- **Seedling/shrub:** Recently clearcut areas that have been replanted with Douglas-fir seedlings. Seedlings are less than 1 inch in diameter and less than 5 feet tall. Grasses, ferns, and various forbs and shrubs are also present. Many of these species were present in the prior forest and persist in the clearcut, for example, evergreen blackberry (*Rubus laciniatus*), fireweed (*Epilobium angustifolium*), and swordfern. Other species, like Himalayan blackberry (*Rubus discolor*) and Scott's broom (*Cystisus scoparius*) are invasive weeds.

- **Sapling:** Saplings are trees between 1 inch and 4 inches in diameter. Saplings do not form a continuous canopy. The Douglas fir are crowding out other species. During this stage, stands are often treated with herbicides to remove competing deciduous trees and shrubs.

- **Pole Forest:** Pole size trees are between 4 inches and 10 inches in diameter. A continuous canopy has formed and little understory persists. Dead branches are present under the active canopy and there is little open space under the canopy. These forests have the lowest species and habitat diversity and host the fewest wildlife species.

- **Early Mature Forest:** Early mature forest has trees greater than 10 inches in diameter. They continue to have a closed canopy with a single canopy layer. Generally, these forests do not have openings, down woody debris, snags, and other features of old-growth forests. An understory shrub layer is beginning to develop.

- **Mature and Old-Growth Forest:** Mature forests are characterized by trees greater than 24 inches in diameter, a multi-layered canopy, a rich understory of shrubs, gaps in the canopy, snags, and down woody debris. Only a small patch of mature forest is found on the south facing bluff in the southwestern corner of the Upper Site.

Several other cover-types are also present in small pockets either within the proposed project area, along the Grouse Ridge Road, or adjacent to the proposed project area, but are too small to map. Table 1 provides the approximate total area of these cover types within the lease area boundaries of the Upper Site (578.0 acres) and Lower Site (115.0 acres). Different stages of vegetation were identified from unrectified color photographs (Janikowski Oost & Associates, March 7, 2000. Flight date of photographs, August 27, 1999) and were further confirmed by field investigation. Approximate areas of each of the cover types described above are listed in Table 1. Acreages listed are rough calculations using unrectified, color photographs and are meant to show proportional cover types and not exact amounts.

TABLE 1
EXISTING VEGETATION COVER TYPE AREAS (acres)

	Lower Site	Upper Site	Total
Clearcut	0.0	0.0	**0.0**
Seedling/shrub	2.0	134.0	**136.0**
Sapling	98.0	236.0	**334.0**
Pole	0.0	185.0	**185.0**
Early Mature	0.0	0.0	**0.0**
Mature	0.0	23.0	**23.0**
Unvegetated Mine / Bare	15.0	0.0	**15.0**
Open Water	0.0	0.0	**0.0**
Total	**115.0**	**578.0**	**693.0**

2.1.2 Mixed Forest

The mixed deciduous-evergreen forest communities in the project vicinity are typical of those that occur at low elevation west of the Cascades. Small pockets of mixed forest are present in the proposed project area, but were too small to map as a separate cover type. Tree species in these forest stands include big leaf maple (*Acer macrophyllum*), red alder (*Alnus rubra*), black cottonwood (*Populus trichocarpa*), western red cedar, western hemlock, Douglas fir, Sitka spruce (*Picea sitchensis*), bitter cherry (*Prunus emarginata*), and Pacific dogwood (*Cornus nuttallii*). The understory of the mixed forest includes such species as vine maple, Indian plum (*Oemleria cerasiformis*), devil's club (*Oplopanax horridus*), red elderberry (*Sambucus racemosa*), trailing blackberry, salmonberry, and sword fern. The mixed forest community is successionally transitional, with the climax plant community being western hemlock/sword fern. The understory of the second growth mixed forest at the site provides habitat for a number of terrestrial vertebrate species. Mixed forest is attractive to wintering wildlife that require adjacent coniferous forest for cover during storm events.

2.1.3 Red Alder Forest

Red alder forests commonly develop following site disturbance and are frequently associated with floodplains and wetlands. This forest type is primarily located outside of the excavation and processing facility areas. Red alder forests also are found in several of the gullies adjacent to the proposed project area and in pockets along SE Grouse Ridge Road. Commercial forest management eliminates this cover type on managed lands.

2.1.4 Riparian Areas

This habitat consists of vegetated areas adjacent to streams located in the proposed project area and along the SE Grouse Ridge Road. Riparian areas are found adjacent to rather than on the project excavation site itself. Riparian areas associated with streams fed by on-site aquifers are located adjacent to the north and south sides of the Upper Site. These areas support a diverse array of shrubs and immature trees including immature Pacific willow (*Salix lucida* spp. *lasiandra*), immature red alder, immature western hemlock, red elderberry, Himalayan blackberry, and youth-on-age (*Tolmiea menziesii*).

Forest management in this region uses herbicide to remove deciduous trees early in stand regeneration. Pre-commercial and commercial thinning remove any remaining deciduous trees.

2.2 STREAMS

2.2.1 Upper Site Streams

During surveys on May 3 to May 5, 1999, the streams draining from perched aquifers in the vicinity of the Upper Site were observed to have approximate discharge rates of less than 0.1 cfs in their headwaters to as much as 0.5 cfs in their lower reaches. For most of their length, these streams have gradients of over 8 percent with the lower reaches of the north flowing streams entering a bowl shaped basin before uniting into a single stream that empties into the Middle Fork of the Snoqualmie River (Figure 3). Stream gradients in this basin were less than 6 percent.

SE Grouse Ridge Road: The SE Grouse Ridge Road, which will be used to access the Upper Site in Alternatives 3 and 4, crosses 14 streams listed in Table 2 (Figure 4). Streams 9a, 10a, and 10b enter streams 9 and 10 immediately upstream of the road, with streams 9a and 10b flowing several hundred feet as roadside ditches. These streams include the South Fork of the Snoqualmie River and 13 small tributary streams. During surveys on May 26, 1999, the South Fork of the Snoqualmie River had a discharge rate of approximately 600 cfs. With the exception of crossing number 2 (approximately 5 cfs), the tributaries had discharge rates of 1 cfs or less. Six of the streams are ephemeral. Crossings number 1 and 2 had gradients of less than 2% while the other tributary streams had gradients of 6 to 15%.

Streams 2 and 5 through 9 crossed by the SE Grouse Ridge Road and those flowing south from the Upper Site all have intact riparian areas of mature second growth mixed conifer forest dominated by hemlock and alder. The South Fork of the Snoqualmie River flows through second growth mixed conifer/deciduous forest at the bridge site. The second growth forest is dominated by red alder with some bigleaf maple, Douglas fir, red cedar, sitka spruce (*Picea sitchensis*), and western hemlock present. Vine maple, Indian plum, red elderberry, devil's club and Pacific dogwood are common understory shrubs along with sword fern, salal, lady fern, deer fern (*Blechnum spicant*), Oregon grape, red huckleberry (*Vaccinium parvifolium*), trailing blackberry, and salmonberry. Streams 3 and 4 flow over a grassy slope for approximately 200-feet below the road and streams 10 through 13 have extensive clearcuts just outside a narrow riparian buffers with the clearcuts often extending inside the buffer to the stream banks. Streams on the north side of Grouse Ridge plateau flow through clearcuts or residential areas, and most of their riparian areas are in early seral stages (early stages of plant community succession), except a narrow strip along the uphill side of Lake Dorothy Road where mature second-growth mixed forest dominates. Red alder with some black cottonwood is the dominant tree in the early successional forest.

TABLE 2
STREAM CROSSINGS ON SE GROUSE RIDGE ROAD

Waterway Crossing		Location Section, Township, and Range Latitude and Longitude			Fish Present at Crossing[a]	DNR Stream Type[b]
Stream Name	Mapped Stream No.					
S.F. Snoqualmie River	1	352309	47º25'58"	121º37'50"	Yes	1
Unnamed Creek	2	342309	47º26'08"	121º38'02"	Yes	3[c,e]
Unnamed Creek	3	342309	47º26'12"	121º37'59"	Yes	3[c,d]
Unnamed Creek	4	342309	47º26'16"	121º38'00"	No	5[c,d]
Unnamed Creek	5	342309	47º26'19"	121º38'08"	Yes	3[c,e]
Unnamed Creek	6	342309	47º26'21"	121º38'11"	No	5[c,e]
Unnamed Creek	7	272309	47º26'26"	121º38'18"	Yes	3[c,e]
Unnamed Creek	8	272309	47º26'27"	121º38'26"	No	5[c,e]
Unnamed Creek	9	272309	47º26'30"	121º38'34"	No	5[c,d,f]
Unnamed Creek	9a	272309	47º26'31"	121º38'35"	No	5[c,g,i]
Unnamed Creek	10	272309	47º26'39"	121º38'41"	Yes	3[c,d,h]
Unnamed Creek	10a	272309	47º26'41"	121º38'42"	No	5[c,g,i]
Unnamed Creek	10b	272309	47º26'38"	121º38'39"	No	4[c,i]
Unnamed Creek	11	272309	47º26'44"	121º38'53"	Yes	3[c,e]
Unnamed Creek	11a	272309	47º26'45"	121º38'57"	No	5[c,d,f]
Unnamed Creek	12	272309	47º26'51"	121º38'59"	No	5[d]
Unnamed Creek	13	282309	47º27'09"	121º39'12"	No	4[c,d]

a All stream reaches of perennial streams accessible to fish contain populations of shorthead sculpin (*Cottus confusus*), rainbow trout (*Oncorhynchus mykiss*), coastal cutthroat trout (*Oncorhynchus clarki clarki*), and rainbow/cutthroat trout hybrids.

b With the exception of the South Fork of the Snoqualmie River, which is inventoried as a "shoreline of the state" under the Shoreline Management Act, all stream classifications were made by the surveyor and are not designations taken from WDNR stream type maps.

c Possible instream work (extension of culverts if road widening is required)

d Impassable culvert

e Partial blockage at culvert

f Heavily scoured stream channel is dry except during rain-on-snow events.

g Roadside ditch fed by short swale above steep embankment.

h Fish are not present above impassable road culvert

i Tributary that enters main stream immediately upstream of road crossing

The stream bottoms are primarily composed of gravel and cobble with some sand and silt present in lower gradient (<6 percent) reaches running through clearcut areas. This habitat is utilized by water-dependent species including amphibians, reptiles, fish, birds, and mammals.

USGS stream gauges were present on the South Fork of the Snoqualmie River above and below the project site (near North Bend and Garcia). The South Fork of the Snoqualmie River is inventoried as a "shoreline of the state" and this information was not necessary to determine DNR stream type.

2.2.2 Lower Site Streams

One stream and one seep run approximately parallel to each other flowing in a southwesterly direction near the northeastern corner of the Lower Site. The stream and seep are approximately 80 feet apart.

Both are ephemeral and infiltrate entirely before reaching a downstream waterbody. The area immediately downslope of the stream and seep is a moist deciduous forest dominated by red alder. Immediately south of the red alder forest is the wetland found at the Lower Site (Wetland A).

Stream 1: Stream 1 extends from outside of the project boundaries northeast to the southwestern corner of the Lower Site. The stream enters the project boundaries on a steep slope with a southwesterly aspect. The upper 50 feet of the creek channel is on an approximately 80 percent slope and travels through large boulders and some Himalayan blackberry with a few small native trees and shrubs. On the lower portion of the stream, the slope decreases to 40 percent before infiltrating underground. A dense thicket of Himalayan blackberry dominates the vegetation for approximately 70 percent of this area. The lowermost 30 percent of the stream is dominated by semi-mature red alder and vine maple.

Surface water was flowing over a 20-foot length in the upper portion of the stream channel. Less flow was observed during the investigation of October 19, 2000 in comparison with the wetland reconnaissance on April 20, 2000 due to seasonal differences in runoff that are typical for streams of the region.

Stream 1 is a Class 3 stream according to KCC 21A.06.1240.C because it has only intermittent or ephemeral flows during years of normal rainfall and is not used by salmonids. A Class 3 stream has a minimum buffer requirement of 25 feet (KCC 21A.24.360.A). Stream and buffer ratings and definitions can be found in the Wetland Delineation Report (Attachment D).

Seep 2 Seep 2 was originally characterized as Stream 2 during the April 20, 2000 investigation. The April investigation was conducted during a time of maximum runoff from snowmelt, causing the seep to flow for only a short time. The visit on October 19, 2000 found that the seep did not exhibit characteristics of a stream according to the definition of streams in KCC 21A.06.1240. This definition requires stream to have a defined channel or bed that demonstrates clear evidence of water passage. Instead, the channel observed in the seep is not well defined. Flowing water appeared to occur as sheet flow across a wider area surrounding the area originally labeled as Stream 2. The seep substrate is comprised of leaf litter from the deciduous, broad-leaved forest. This substrate is not very different from the surrounding forest floor. Vegetation is dominated by red alder in the canopy, vine maple in the mid-story, and sword fern in the understory.

2.3 WETLANDS

The findings of the wetland reconnaissance conducted for the Lower Site were verified as accurate during the wetland delineation conducted on October 19, 2000. However, discrepancies exist between the reconnaissance and delineation investigations conducted on SE Grouse Ridge Road. The delineation investigation discovered that some of the wetlands identified during the reconnaissance visit do not fulfill all the wetland criteria. In contrast to the results of the wetland reconnaissance as reported in the DEIS, only one wetland (Wetland C) exists along the SE Grouse Ridge Road. Sample plots discovered non-hydric soils and upland vegetation dominance in five areas incorrectly identified as wetlands.

Wetlands A and C, and the areas previously identified as wetlands, are described in detail in Attachment D, Wetland Delineation Report.

2.4 POTENTIALLY AFFECTED FISH AND WILDLIFE SPECIES

Attachment B includes a species habitat matrix prepared by King County (1987) that is edited for the proposed project area. It identifies a range of species that would be expected in the several different cover types fond in the proposed project area. The King County species habitat matrix is a compilation of many years of survey efforts by many investigators. The matrix currently provides the standard "best estimate" of species that may be present on the project lands.

Each of the species listed below was identified during biological resource investigations conducted at the proposed project site by URS biologists. Species were identified by visual observation or other signs of presence (scat, tracks, beaver dams, calls, etc.).

2.4.1 Mammals

Large mammals like elk (*Cervus elaphus*) and black-tailed deer (*Odocoileus hemionus columbianus*) utilize habitat within the project sites. These ungulates were identified from visual sightings of deer and tracks and scat of both elk and deer.

Historically elk inhabited much of North America excluding northern Canada, Alaska, and Florida. Prior to European settlement of North America, estimated populations of elk were upwards of 10 million individuals. By the late 1800s, populations were reduced to approximately 1% (100,000) of the former estimated population. Most of the remaining elk were concentrated in the remote Yellowstone National Park area (Thomas and Toweill 1982).

In 1905, legislation was passed in Washington that closed elk hunting seasons for the next 28 years. Subsequent reintroductions of Rocky Mountain elk (*Cervus elaphus nelsoni*) from Yellowstone National Park to the Blue Mountains, Selkirk Mountains, Wenatchee Mountains, and the Yakima River area brought the 1979 population of Rocky Mountain elk in Washington to approximately 24,000. By 1979 the population of Roosevelt elk (*Cervus elaphus roosevelti*) in Washington was estimated at approximately 36,000 (WDG 1979).

Two races of elk occupy Washington. Roosevelt elk are found mainly west of the Cascade Mountains–primarily on the Olympic Peninsula, while Rocky Mountain elk are found mostly in and east of the Cascade Mountains. Wintering Rocky Mountain elk originally from the Cedar River Watershed inhabit the proposed project site, particularly near the proposed lower processing facility.

Rocky Mountain elk on the western slope of the Cascades apparently migrated from the introduced Yakima herd on the eastern slope. Population counts during the 1970s estimated the population of Rocky Mountain elk in the nearby Cedar River Watershed at 300 individuals. Present populations of elk in the Cedar River Watershed are unknown. Elk inhabiting mountainous regions generally tend to migrate in response to seasonal changes. Snow depth is often the most important factor influencing timing and rate of migration (Thomas and Toweill 1982). Migratory elk populations in the Cedar River Watershed tend to confine their seasonal movements to areas with less than 18 inches of snow cover (Schoen 1977). Elk in the Cedar River Watershed have been observed by Schoen (1977) to display both migratory and resident habits. Two thirds of the approximately 300 elk in the 1977 study were found to be migratory, while the remaining third were considered non-migratory. Local residents were contacted regarding elk

occurrences in the project vicinity. Most residents recall observing elk mainly during fall and winter months, however a few residents recall seeing elk during summer months. Residents also mentioned that elk in the area are known to forage on landscaping planted by lot owners.

Common mammal predators are coyote (*Canis latrans*), black bear (*Euarctos americanus*), cougar (*Felis concolor*), weasels (*Mustela* sp.), mink (*Mustela vison*), and river otters (*Lutra canadensis*). Beaver can be found in streams and ponds near the study area (*Castor canadensis*). Small mammals include Snowshoe hares (*Lepus americanus*), Douglas squirrels (*Tamiasciurus douglasii*), deer mice (*Peromyscus maniculatus*), shrews (*Sorex* sp.), moles (*Scapanus* sp.*),* voles (*Phenacomys* sp. *and Microtus* sp.), mountain beavers (*Aplodontia rufa*), and other small rodents. Coyotes, Douglas squirrels, a bobcat (*Lynx rufus*) and snowshoe hares were observed at the project sites.

2.4.2 Birds

Birds commonly observed at the project site, especially in young mixed forest areas, included American robins, song sparrows (*Melospiza melodia*), northern flickers (*Colaptes auratus*) spotted towhees (*Pipilo maculatus*), gray jays (*Perisoreus canadensis*), dark-eyed juncos (*Junco hyemalis*), Townsend's solitaires (*Myadestes townsendi*), European starlings (*Sturnus vulgaris*), and rufous hummingbirds (*Selasphorus rufus*). Hairy and downy woodpeckers (*Picoides villosus* and *Picoides pubescens*) were common in medium semi-mature aged red alder forests adjacent to the project site. Winter wrens (*Troglodytes troglodytes*), and Bewick's wrens (*Thryomanes bewickii*) were common in brush piles associated with stacking of woody debris in recent clearcuts. Band-tailed pigeons (*Columba fasciata*) were observed near the top of Grouse Ridge near the upper terminus of the proposed conveyor belt. Red-tailed hawks (*Buteo jamaicensis*), turkey vultures (*Cathartes aura*), and American crows (*Corvus brachyrhynchos*) were observed soaring above all habitats at the project site.

2.4.3 Reptiles and Amphibians

Northern alligator lizards (*Elgaria coerulea*) were observed near rock piles on the Lower Site and western toads (*Bufo boreas*) were observed in mixed forest in the vicinity of the Upper Site. Pacific chorus frogs (*Pseudacris regilla*), roughskin newts (*Taricha granulosa*), red-legged frogs (*Rana aurora*), northwestern garter snakes (*Thamnophis ordinoides*), and common garter snakes (*Thamnophis sirtalis*) were observed near ephemeral streams associated with on-site topographical drainages and near streams and beaver ponds draining from the north side of Grouse Ridge. Suitable habitat for Tailed frogs (*Ascaphus truei)* is unlikely at the project site due to the lack of permanent water sources. Tailed frogs may occur in streams draining the north and south sides of the Grouse Ridge plateau, outside of the project area.

2.4.4 Fish

An unnamed tributary of the Middle Fork of the Snoqualmie River fed by perched aquifers on the north side of the Grouse Ridge plateau supports coastal cutthroat trout *(Oncorhynchus clarki clarki*), rainbow trout (*O. mykiss*), and brook trout (*Salvelinus fontinalis*). Brook trout and rainbow trout are not native to the stream. The brook trout were planted into beaver ponds in the stream system and the rainbow trout have been planted into a private trout pond. Although cutthroat trout are probably native to the stream, hatchery cutthroat may have been planted in the larger beaver ponds within the system. Information about plants of trout in the beaver ponds was obtained from the manager of Vallley Camp and a resident

of the house located near the beaver pond complex on the west fork of the stream. No planting records could be found for the coastal cutthroat trout and brook trout released into the large beaver pond complex on the west fork of the tributary stream. Resident coastal cutthroat trout are found in the three main forks of the above-mentioned tributary from the Lake Dorothy Road upstream to an elevation of approximately 1,100 feet.

The middle fork of this stream has several small beaver ponds at an elevation of approximately 920 feet that support numerous small (<6") cutthroat trout, with trout present as far upstream as the crossing of a forest road at an elevation of about 1,000 feet. Numerous trees have been recently felled by beavers in the vicinity of these ponds, indicating an active beaver colony. A small spring feeds an ephemeral stream channel (indicated by a dotted line on Figure 3) that runs parallel and approximately 600 feet to the west of the unnamed tributary's middle fork. Water is only present in the ephemeral stream channel in the first 100 feet of the channel below the spring and no fish are present. The unnamed tributary's east fork forks into two smaller tributaries, one on each side of a gravel pit located northwest of the State Fire Training Center. Cutthroat tout in both of these tributaries are present above the crossing of a forest road to an elevation of approximately 1,100 feet. The trout population in the larger of these tributaries is separated into two sub-populations by an impassible culvert at the road crossing. The middle and east forks of this stream flow around Vallley Camp near the Lake Dorothy Road and combine their flows shortly before passing through an impassible culvert under the Lake Dorothy road. Below the road, the stream flows for approximately 1000 feet through a residential area before crossing under a bridge at the Middle Fork Road and flowing into the Middle Fork of the Snoqualmie River. This section of the stream from the Lake Dorothy Road to the Middle Fork of the Snoqualmie River supports resident and fluvial (larger trout from the Middle Fork of the Snoqualmie that spawn in the tributary stream) coastal cutthroat trout and rainbow trout (escapees from a privately stocked trout pond). The west fork of this stream passes through an impassible culvert under the Lake Dorothy road and into the stream's mainstem. Three large beaver ponds in a marshy area on the west fork of the stream above the Lake Dorothy road support coastal cutthroat and brook trout. There is good quality spawning gravel in the creek above the ponds. The beaver colony that maintained these ponds has moved out of the area and the level of the ponds has dropped approximately 2 to 3 feet below its original level. Western brook lamprey (*Lampetra richardsoni*) and shorthead sculpin (*Cottus confusus*) are also found in this stream.

Another stream flowing directly south of the Washington State Patrol Fire Training Academy supports coastal cutthroat trout and rainbow trout in a 500-foot reach between I-90 and where it flows into the South Fork of the Snoqualmie River. This stream reach contains numerous beaver ponds and little spawning gravel is available for the few trout observed in these shallow ponds.

Streams crossed by SE Grouse Ridge Road at crossings number 1, 2, 3, 5, 7, 10, and 11 contain populations of coastal cutthroat trout, rainbow trout, and shorthead sculpin. The South Fork of the Snoqualmie River (crossing number 1) supports a sports fishery for rainbow and cutthroat trout. The tributaries at crossings 2, 3, 5, 7, 10, and 11 have good quality gravel and provide important spawning areas for fluvial populations of trout in the river.

2.5 THREATENED AND ENDANGERED SPECIES

Information concerning threatened and endangered species and habitats in the project vicinity was requested and received from the U.S. Fish and Wildlife Service (USFWS), the Washington State Department of Fish and Wildlife (WDFW), and the Washington Natural Heritage Program (WNHP). For copies of this correspondence, see Attachment A.

The USFWS listed no plant species within or near the project area. The WNHP also has no record of any occurrence of rare plants within a mile of the Upper and Lower sites or Fire Training Road. The sites are heavily disturbed by previous logging and mining activity and are therefore not appropriate habitat for the Endangered, Threatened, and Sensitive vascular plants listed as occurring in King County by the Washington Department of Natural Resources.

2.5.1 Federally Listed Species

2.5.1.1 Bull Trout (*Salvelinus confluentus*) Coastal-Puget Sound DPS

Status: The Coastal-Puget Sound District Population Segment of bull trout from the coastal drainages and Puget Sound in Western Washington was listed as threatened by the USFWS on November 1, 1999.

Background Information: Anadromous (sea-run), fluvial (living in mainstem streams), lacustrine (lake-dwelling), and stream resident (living in tributary streams) populations of bull trout are found in coastal drainages from the Chehalis River to the Canadian border (WDFW 1992 and WDFW 1998). Bull trout and Dolly Varden trout are difficult to distinguish in the field and are managed as a single species (native charr) by WDFW (WDFW 1992 and WDFW 1995). Strict cold water temperature requirements make bull trout vulnerable to activities that warm spawning and rearing waters. Bull trout fry remain in the intragravel environment for an extended time between hatching and emerging from the gravel. Their juvenile life phase is also closely associated with the stream bottom and the intragravel environment. This extended relationship with the intragravel environment may be a major reason why bull trout populations are suppressed in unstable stream channels or substrates with a high percentage of fine sediments.

A Literature Review and Recommended Sampling Protocol for Bull Trout in King County by R2 Resource Consultants, Inc. and Historical Research Associates, Inc. (2000) states that "native char" [bull trout and Dolly Varden char (*Salvelinus malma*)] have not be found above anadromous fish barriers in the Snohomish River Basin, with the exception of Sunset Falls on the South Fork Skykomish River and a fall on Troublesome Creek in the North Fork Skykomish River drainage. None of the extensive surveys of the river above the falls using electrofishing, snorkeling, angling, and creel surveys by US forest Service, Army Corps of Engineers, Washington Department of Fish and Wildlife, and private consultants have detected the presence of any char except brook trout. The King County document recommended reconnaissance sampling for native char in six stream basins where habitat characteristics are suitable for bull trout spawning and rearing, but the presence of self-sustaining populations has not yet been conclusively proven.

Based on the abundance of suitable spawning and rearing habitat, the upper Snoqualmie River basin above Snoqualmie Falls was included among the basins for reconnaissance sampling. Of the two existing

populations of native char above anadromous fish barriers in the Snohomish River Basin, the Troublesome Creek population is a relic resident population isolated above a natural waterfall. Native char were never documented above Sunset Falls on the South Fork Skykomish River until the native fluvial/anadromous population below the falls was able to invade the subbasin and establish a spawning population in Foss River Drainage with the construction of the Sunset Falls trap-and-haul fishway in the mid-1950s. Considering the fact that native char became readily documented in the South Fork Skykomish River shortly after the extensive rearing and spawning habitat became available, it is unlikely that a fluvial population of large native char would never be documented in the upper Snoqualmie River basin where extensive rearing and spawning habitat exists (particularly in the Middle Fork Snoqualmie River watershed). The presence of a population of large fluvial native char would be unlikely to have escaped the notice of local sports anglers and would likely have been reported in creel surveys and newspaper accounts. In the unlikely event that populations of native char do exist in the upper Snoqualmie River watershed, they are most likely to be a relic population above a waterfall on a snow-melt fed tributary stream similar to the Troublesome Creek population in the North Fork Skykomish River basin or a population of Dolly Varden char that is known to exist above a barrier falls on the Sol Duc River (although no native char have been document below Sol Duc Falls). This kind of habitat is only found in snow-melt fed tributary streams far upstream from the vicinity of the proposed project areas.

Populations in the proposed project area: Bull trout are present throughout the Snoqualmie River basin below Snoqualmie Falls. Bull trout have not been documented in the Snoqualmie River basin above Snoqualmie Falls and it is unlikely that they occur in the vicinity of the proposed project area (personal conversation Jeff Chan, USFWS).

2.5.1.2 Northern spotted owl (*Strix occidentalis caurina*)

Status: The northern spotted owl is federally listed as threatened and state listed as endangered.

Background Information: Spotted owls occur in mountainous and humid coastal forests from southwestern British Columbia, south through western Washington and western Oregon, to southern California and possibly northern Baja California; and in the Rocky Mountains from southern Utah and southwestern Colorado, south to the mountains of Arizona, New Mexico, and western Texas, and south into northern and central Mexico (AOU 1983).

This species is dependent on stands of mature and old-growth forest with a multi-layered canopy (Johnsgard 1988). Spotted owls occupy northern interior forests with a moderate to high canopy closure, a multi-layered multi-species canopy with large trees, a high degree of deformities in large trees, large snags, fallen trees and other debris on the ground, and open space below the canopy (Jackson et al. 1995). Spotted owls prey on other forest species such as wood rats, deer mice, voles, rabbits, flying squirrels, bats, birds, and some reptiles and invertebrates (Johnsgard 1988) (Terres 1991).

Spotted owls generally nest in tree cavities, on stick platforms, or on other debris in old-growth conifer trees. Resident owls start roosting near nesting territories in February or early March with actual egg laying occurring March to May (Terres 1991). Generally two eggs are laid and hatch about a month after being laid.

The primary threat to this species is the loss of habitat from forest management practices (Johnsgard 1988).

Populations in the proposed project area: There are no documented sightings of spotted owls within the proposed project area.

The Washington Department of Natural Resources implemented a Habitat Conservation Plan (HCP) for its commercial forest lands within the range of the northern spotted owl. HCPs are prepared under the federal Endangered Species Act and address the conservation of listed and other species. HCPs are approved by the US Fish and Wildlife Service and the National Marine Fisheries Service. Under the HCP, the land owner may manage its lands as a whole for the conservation of the northern spotted owls and marbled murrelets (and other included species) and is relieved of the requirement to manage its forest lands nest site by nest site.

In WDNR's HCP, their lands to the east of the proposed project area are designated as nesting, roosting, foraging (NRF) habitat for the northern spotted owl. Land adjacent to SE Grouse Ridge Road is primarily WDNR land and is designated as NRF habitat, from Exit 38 to approximately 1500 feet from the Fire Training Center. Figures 1C and 1D show the existing vegetation along SE Grouse Ridge Road. Dominant vegetation cover types include mixed deciduous and coniferous forest, deciduous forest, and recent clearcut harvested areas. No spotted owl nests are known in the area because the current forest patches are not suitable habitat. They do not contain the old-growth components that compose owl habitat. The area, in time and with no harvest activity, could become suitable nesting/foraging habitat.

2.5.1.3 Marbled Murrelet (*Brachyramphus marmoratus*)

Status: The marbled murrelet is federally and state listed as threatened.

Background Information: Marbled murrelets are distributed from Sakhalin Island to the Kamchatka coast in Asia and from Kodiak Island in Alaska south to central California in North America (AOU 1983). These birds are unique in that they breed in coastal rain forests while living in shore waters at other times. While nesting, marbled murrelets feed and gather fish in sheltered coastal waterways and fly inland at twilight to nests built high up in large limbs of mature trees up to 52 miles inland from salt water in the coastal mountains (Marshal 1988). By 1995, the number of known nests in the USA was 95, nine of which were in Washington (Federal Register 1996). Good breeding habitat includes all west-side mid- and late-seral conifer and mixed forests in zones below the mountain hemlock zone west of the Cascade crest, and interior western hemlock zone just east of the Cascade crest.

Populations in the proposed project area: There are no documented sightings of marbled murrelets within the proposed project area.

2.5.2 Federal Species of Concern

2.5.2.1 California wolverine *(Gulo luscus)*

Status: The California wolverine is a federal species of concern and a candidate for state listing.

Background Information: California wolverines are very scarce mammals inhabiting high elevation alpine and sub-alpine habitats of the high Sierra Nevada and Cascade mountain ranges well removed from areas of human disturbance. The wolverine eats small animals, including porcupines, and feeds on the carcasses of much larger animals. Since its home is at timberline, it probably does not prey on domestic animals.

Populations in the proposed project area: Although there have been historic sightings of wolverine in the Snoqualmie Ranger District, these sightings were in the Alpine Lakes Wilderness Area. No sightings have been reported in the proposed project area. Suitable habitat for California wolverines does not occur in the project vicinity given the low elevations at or near the project site, the Lower Site's proximity to a residential area, and the lack of proximity to sub-alpine and alpine habitat.

2.5.2.2 Pacific fisher (*Martes pennati pacifica*)

Status: The Pacific fisher is a federal species of concern and state listed as endangered.

Background Information: The fisher is found in the Pacific Northwest from the Sierra Nevada and north Coast Ranges in California across Oregon and Washington. Pacific fishers occur in extremely limited numbers in Washington State. Preferred habitat of these small mammals includes multi-storied mature and old-growth forests with large diameter trees, large snags, multiple canopies, logs, and tree cavities. Fishers avoid openings in forest canopies (openings greater than 1,000 feet wide are barriers to dispersal) and are closely associated with forested riparian areas, which are used extensively for foraging, resting, and as travel corridors. Major highways are barriers to their movement. On the west side of the Cascades, fishers are found primarily below 3,000 feet elevation. The fisher eats small mammals and birds, with its chief food being porcupines, squirrels, wood rates, mice marmots, mountain beavers, quail, and grouse. The preferred prey species is the porcupine, which the fisher preys on so frequently that few fishers are caught without quills in their skin (which do not seem to fester or otherwise harm the fisher).

Populations in the proposed project area: Fishers have been historically sighted in the headwaters of the North and Middle Forks of the Snoqualmie River and it is likely that these drainages may support one or more pairs of fisher. No sightings have been reported in the proposed project area. Suitable habitat for the Pacific fisher does not occur in the project vicinity given the young fragmented forests and large openings throughout the project site. The project site is also widely separated from the unfragmented habitat of the upper North and Middle Forks of the Snoqualmie River.

2.5.2.3 Long-eared myotis *(Myotis evotis)*

Status: The long-eared myotis is a federal species of concern.

Background Information: Distributed widely, but not in abundance, throughout forested areas in the Pacific Northwest, the long-eared myotis bat typically inhabits coniferous forests west of the Cascades. Hibernation during winter months and roosting often occurs in caves, cliff faces, abandoned buildings, and mines.

Populations in the proposed project area: None of these bats have been documented near the proposed project area. Suitable foraging habitat for the long-eared myotis may exist on the project site, although the lack of caves or other suitable roosting sites at the proposed project area is likely to discourage resident populations.

2.5.2.4 Long-legged myotis *(Myotis volans)*

Status: The long- legged myotis is a federal species of concern.

Background Information: Occurring in forested areas throughout the Pacific Northwest, the long-legged myotis bat typically inhabits coniferous forests west of the Cascades. This is one of the more common species of *Myotis* in the northwest. Hibernation during winter months and roosting often occurs in caves, cliff faces, abandoned buildings, and mines.

Populations in the proposed project area: None of these bats have been documented near the proposed project area. Suitable foraging habitat for the long-eared myotis may exist on the project site, although the lack of caves or other suitable roosting sites at the proposed project area is likely to discourage resident populations.

2.5.2.5 Pacific Townsend's big-eared bat (*Corynorhinus townsendii townsendii*)

Status: The Pacific Townsend's big-eared bat is a federal species of concern and a candidate for state listing.

Background Information: The Pacific Townsend's big-eared bat typically inhabits coniferous forests west of the Cascades. Relatively rare, this bat is very intolerant of human disturbance at both winter hibernacula and summer roosts. Hibernation during winter months and roosting often occurs in caves, cliff faces, abandoned buildings, and mines.

Populations in the proposed project area: None of these bats have been documented near the proposed project area. Suitable foraging habitat for this species may exist on the project site, although the lack of caves or other suitable roosting sites at the proposed project area is likely to discourage resident populations.

2.5.2.6 Northern Goshawk (*Accipiter gentilis*)

Status: The northern goshawk is a federal and state species of concern.

Background Information: Northern Goshawks are distributed throughout mountain forests throughout North America. Northern Goshawks that occupy western Washington are not typically found below the western hemlock zone or in any lowland areas and prefer mature and old-growth coniferous forest mixed with deciduous forest with closed canopies.

Populations in the proposed project area: There have been no sightings of goshawks near the proposed project area.

2.5.2.7 Olive-sided flycatcher *(Contopus cooperi)*

Status: The olive-sided flycatcher is a federal species of concern.

Background Information: The olive-sided flycatcher breeds from Alaska across Canada and south to North Carolina in the east, and the mountains of the southwestern states in the west. Olive-sided flycatchers are common in most forested regions of Washington. This species prefers large stands of trees adjacent to clearcuts, burned areas, and bodies of water.

Populations in the proposed project area: Suitable foraging and nesting habitat may occur at the site for this species.

2.5.2.8 Cascade frog (*Rana cascadae*)

Status: The Cascade frog is a federal species of concern.

Background Information: Cascade frogs occur in wet meadows, marshes, and pond edges in the Cascades and Olympic Mountains, usually above 2,600 feet. Recent field studies indicate a decline in population numbers (Nussbaum et al. 1983).

Populations in the proposed project area: Suitable habitat for Cascade frogs is unlikely at the project site due to the lack of permanent water sources. Cascade frogs may occur along streams draining the north and south sides of the Grouse Ridge plateau.

2.5.2.9 Tailed frog (*Ascaphus truei*)

Status: The tailed frog is a federal species of concern.

Background Information: Tailed frogs occur in cold clear mountain streams, and nearby woodland habitats. Areas of suitable habitat can provide conditions that support large population densities. Elevated stream temperatures and subsequent silt accumulation associated with logging have reduced available habitat for this species (Nussbaum et al. 1983).

Populations in the proposed project area: Suitable habitat for Tailed frogs is unlikely at the project site due to the lack of permanent water sources. Tailed frogs may occur in streams draining the north and south sides of the Grouse Ridge plateau.

2.5.2.10 Pacific lamprey (*Lampetra tridentata*)

Status: The Pacific lamprey is a federal species of concern.

Background Information: The Pacific lamprey is found in coastal streams from southern California to the Gulf of Alaska. It is apparently rare north of the Alaska peninsula. It has also been taken off the coast of Japan but is not known to spawn in Asia (Wydoski and Whitney 1979).

The Pacific lamprey is an anadromous lamprey that enters freshwater between July and September, and may migrate several hundred miles inland (Scott and Crossman 1973). They do not mature until the following March. Spawning occurs in sandy gravel immediately upstream from riffles between April and July. Eggs hatch in two to three weeks and the ammocoetes (larvae) spend up to the next six years in soft substrate before they emigrate to the ocean. They remain in the ocean for 12 to 20 months before returning to fresh water to spawn. The adults are parasitic on fish in the Pacific Ocean while the ammocoetes are filter feeders that inhabit the fine silt deposits in backwaters and quiet eddies of streams (Wydoski and Whitney 1979).

Populations in the proposed project area: The proposed project area is located above a barrier to anadromous fishes (Snoqualmie Falls). Pacific lamprey have not been documented in the Snoqualmie River basin above Snoqualmie Falls and non-anadromous populations have never been documented (Beamish and Northcote 1988).

2.5.2.11 River lamprey (*Lampetra ayresi*)

Status: The River lamprey is a federal species of concern. It is also a candidate species for listing by the WDFW.

Background Information: The river lamprey is found in coastal streams from the Sacramento River, California north to Tee Harbor near Juneau. It is apparently rare north of the Alaska peninsula. It has also been taken off the coast of Japan but is not known to spawn in Asia (Wydoski and Whitney 1979).

The river lamprey is an anadromous lamprey that enters freshwater between September and late winter. Relative to Pacific lamprey, the river lamprey tends to use areas close to the coast as fresh water habitat (Beamish 1980). They spawn the following April to June, and subsequently die. At the appropriate age, the young metamorphose in July but do not emigrate to the ocean until the following May to July. The adults are parasitic on fish in the Pacific Ocean while the ammocoetes (larvae) are filter feeders that inhabit the fine silt deposits in backwaters and quiet eddies of streams (Wydoski and Whitney 1979).

Populations in the proposed project area: The proposed project area is located above a barrier to anadromous fishes (Snoqualmie Falls). River lamprey are strictly anadromous and have not been documented in the Snoqualmie River basin above Snoqualmie Falls.

3.0 ENVIRONMENTAL IMPACTS

3.1 ALTERNATIVES

Development of a gravel extraction and processing operation has been proposed on land located east of North Bend, in unincorporated King County. The four alternatives that have been defined for the land provide the basis for the analyses presented in this technical report:

- Alternative 1–No Action.
- Alternative 2–Proposal: Lower and Upper Sites Mining - Exit 34. The Proposal involves development of two separate areas of the land, referred to as the Edgewick (Lower) Site and the Grouse Ridge (Upper) Site, for gravel extraction and processing. Operations will include the excavation, washing, crushing, sorting, and stockpiling of sand and gravel. Concrete and asphalt batch plants in the Lower Site may be built in later stages of site development. Extraction will initially occur in the 40 acres at Lower Site, with material hauled from the site via Exit 34. Material from the Upper Site will be moved to the Lower Site using a 36 to 42 inch wide conveyor.
- Alternative 2A–Upper Site Mining and Limited Lower Site Mining - Exit 34. Under this option, Cadman, Inc. proposes to extract gravel from approximately 33.5 acres of the 115-acre site over a 5-year period.
- Alternative 3–Lower and Upper Sites Mining - Exits 34 and 38. Gravel extracted from the Edgewick (lower) site will be transported from the site via Exit 34. After extraction has been completed in the Lower Site, the upper Grouse Ridge site would be developed, with material hauled out via Exit 38 and SE Grouse Ridge Road. Aggregate processing will take place on the Upper Site. The concrete and asphalt batch plants, if built, will be located at the Lower Site. This alternative does not include a conveyor line between the Upper and Lower Sites.
- Alternative 3A–Upper Site and Limited Lower Site Mining - Exits 34 and 38. Under this option, Cadman, Inc. proposes to extract gravel from approximately 33.5 acres of the 115-acre site over a 5-year period.
- Alternative 4–Upper Site Mining - Exit 38. Under this alternative, the Lower Site will not be developed. Extraction and aggregate processing will occur at the Upper Site, with processing materials hauled out via SE Grouse Ridge Road. Onsite concrete and asphalt batch plants will not be included in this alternative.

3.2 CONSTRUCTION, OPERATION, RECLAMATION IMPACTS

The proposed project includes: clearing vegetation from the facilities areas and the gravel mine, removing and stockpiling topsoil and large woody debris, mining and or construction and operation of processing facilities, closing the mine or facilities, recontouring the mined area, replacing topsoil and woody debris, and replanting for erosion and sediment control and replanting to commercial forest. The proposed construction, operation, and reclamation of the proposed project areas is discussed for each alternative in Chapter 2. The action alternatives propose to mine in a phased process over a 25-year period. At the Lower Site, approximately 40 acres would be mined and 25 acres subsequently used for

project facilities. The remaining 75 acres would be planted and maintained as buffer. The mined area not used for facilities, roads, and storage areas would be restored and planted as commercial forest.

The 318 acres of the peripheral portion of the 578-acre Upper Site would be retained as buffer. The buffer area includes the small portion of mature forest found in the southwest corner of the Upper Site that would be maintained as high-value wildlife habitat. Of the 260 acres proposed for mining and facilities, at any one time only about 50 acres would be in active use. Mining would proceed from west to east. In the year prior to mining, an area to be mined would be cleared of vegetation, topsoil and woody debris removed and stockpiled, and the area made ready for mining. Mining would be completed in several years and the site then contoured, topsoil and woody debris restored, erosion and sediment control vegetation would be planted and the area replanted with commercial forest species, primarily Douglas fir trees.

Major portions of the Upper and Lower Sites would be in buffers and would remain untouched throughout the project life. In phased strips, the mine area would be cleared of vegetation, mined, and restored to commercial forest vegetation. The mining cycle would take approximately 5 years from clearing to restoration. Prior to replanting, topsoil and large woody debris would restored to the mined areas. Topsoil would provide organic matter, some native plants, and soil flora. Restored areas would be replanted with erosion-sediment control seed mixes and subsequently planted with Douglas fir seedlings during the following winter. Volunteer weedy plants would also become established in the restored areas. The restored areas would not have the diversity of plants found in existing clearcuts and it may take longer for a robust seedling/shrub community to develop following mining.

3.2.1 Habitat Types

A map of the existing vegetation within the lease area boundary was prepared to characterize and quantify habitat types in the study areas. Different stages of vegetation were identified from unrectified color photographs (Janikowski Oost & Associates, March 7, 2000. Flight date of photographs, August 27, 1999) and were further confirmed by field investigation. Seven cover types were identified: clearcut, seedling/shrub, sapling, pole, mature, unvegetated bare mine, and open water. The cover types are characterized in Section 2.1, Wildlife Habitat. Acreages listed are rough calculations using unrectified, color photographs and are meant to show proportional cover types and not exact amounts.

Based on photointerpretation and descriptions of the alternatives, the table in Attachment C represent vegetation acreages for each alternative as described in Chapter 2 of the FEIS. For planning purposes, the following assumptions were made; the timing of the phases will vary with market demand and lands will be planted and managed as working forest after mining. The rate of gravel extraction and revegetation in the Upper Site will vary with market demand, and will therefore dictate the timing of restoration of each segment. The Memorandum of Understanding (Appendix A) states that Weyerhaeuser will offer the land to Washington Department of Natural Resources upon segment completion. The land will continue to be managed as working forest. The table is divided into two sections, acres disturbed by mine operations and 25 years after mine decommission. Twenty-five years after mine decommission means 25 years from the last day of decommissioning activity, approximately 50 years from the present. Per the MOU, the proposed project area will be managed as a working forest, ultimately subject to pre-commercial

thinnings, clearcuts and other forest practices. Impacted areas that are revegetated upon mining completion will likely reach the pole stage after 25 years.

3.2.1.1 Alternative 1–No Action

The proposed project area would continue to be operated as commercial forest on a rotation cycle of from 25 to 60 years for complete harvest.

3.2.1.2 Alternative 2–Proposal: Lower and Upper Sites Mining - Exit 34

Wildlife and Terrestrial Resources

The impacts of construction and operation are primarily the result of temporary loss of wildlife habitat associated with the forestlands in various stages of harvest and regeneration. Wildlife would be displaced from areas in active mining and in areas used for facilities. When wildlife is displaced, it usually moves to adjacent suitable habitat. However, if adjacent or nearby habitats are at their carrying capacity for a particular species, then the arrival of displaced wildlife may cause stress in the affected populations, resulting in a temporary decrease in productivity, health, and an increase in mortality for the displaced populations. If Rocky Mountain elk utilizing the Lower Site as winter range are displaced to similar low elevation habitat in adjacent areas, they may use residential areas for foraging.

Active mining segments will be unusable as olive-sided flycatcher foraging and nesting habitat until site restoration of each segment reaches an appropriate seral stage. Any olive-sided flycatchers using the project sites would be affected until site restoration is completed. The habitat lost is neither unique nor rare, and flycatchers would be able to use newly restored habitat as the plant communities mature enough to provide food and cover. No other special status species would be affected by the project.

Several resident and migratory species would be disturbed by construction and operation activity. Most birds and mammals would be displaced into adjacent habitats. Smaller animals, such as amphibians and reptiles, would be impacted during pre-mining clearing. If clearing activities take place during the breeding season, nests and dens containing eggs and/or juveniles would be impacted.

Mining noises can discourage wildlife species from using portions the project sites. Loud, sudden noises will startle mammals and birds into sudden movements or flight. In general, however, most species will habituate to mining activity and continue to use the habitat areas adjacent to mining activity. Animals are generally tolerant of regular steady noise such as would be produced by the steady operation of mining machinery. Research that has been conducted to examine the effects of noise on animals has focused primarily on investigations of high noise levels on laboratory animals, studies of ambient noise measurements in barns or kennels, or the effects of aircraft noise. These studies generally indicate that if adverse effects are present, the effects do not occur until noise levels approach 95 to 100 dBA. Adverse effects would include avoidance behavior and stress related effects (reduced condition factors and breeding success). Noise levels in adjacent areas due to mining operations would not exceed the Washington State Department of Ecology's Environmental Designation for Noise Abatement (EDNA) levels, which are well below noise levels known to affect animals during laboratory studies. However, some areas would experience increases of more than 10 dBA, which is considered significant under EPA guidelines. Mitigation of these noise impacts is feasible and is discussed in the North Bend Gravel

Operation Noise Technical Report. WDFW has established guidelines to protect certain animal species from disturbance due to helicopter noise. These guidelines establish buffer zones of one-quarter mile and one-half mile both horizontally and vertically around the nesting areas of certain endangered bird species (such as bald eagle, spotted owl and marbled murrelet). None of these species nest sites are located within a mile of the proposed lease area.

Construction of the conveyor and maintenance road would result in the clearing of approximately 7.3 acres between the Upper Site and Lower Site. The proposed conveyor connecting the Lower and Upper Sites may constitute a barrier to movement of deer and elk. The maintenance road would pass under the conveyor in two locations, and an existing forest road would pass under the conveyor in one location, providing access for deer and elk.

Aquatic and Riparian Resources

Construction of the passive freshwater storage pond would have impacts on a stream and a seep and the riparian zones located within the Lower Site. The proposed pond will be approximately 3.8 acres (164,200 cubic feet) in area, approximately 30 feet deep, and lined to prevent infiltration. Pond construction will avoid impacts to the stream and seep, their respective riparian areas, and one wetland and its buffer area located near the northeast corner of the Lower Site. The channel of the stream is approximately 500 feet in length, has a boulder and silt substrate, and infiltrates entirely within 200 feet of entering the site. The stream and seep do not feed any waterway, body of water, or wetland and do not contribute to fish habitat. The riparian areas provide habitat for terrestrial species and some wetland-dependent species such as Pacific chorus frogs and red-legged frogs. However, the stream and seep dry up in early spring and thus are unlikely to provide any habitat for amphibian larvae.

Excavation at the Upper Site may modify discharge from perched aquifers feeding the middle and east forks of the unnamed tributary of the Middle Fork of the Snoqualmie River and the stream flowing directly south of the Washington State Patrol Fire Training Academy into the South Fork of the Snoqualmie River. This could slightly increase spring flows and reduce flows in summer and fall, primarily affecting stream reaches above the distribution of fish. Flow from these aquifers contributes only a small portion of the total flow in the stream reaches that support fish. Total flow from the springs ranged from 0.1 to 0.3 CFS (cubic feet per second) for streams flowing north and the same range of volumes for springs flowing into the south flowing streams. Measurements of stream flow in reaches that support fish showed no correlation with changes in spring flows from perched aquifers. Changes in spring flows fed by perched aquifers are unlikely to have significant impacts on stream volumes, fish and amphibian populations, aquatic macroinvertebrates, or beaver colonies in lower reaches of these streams. Cascade and tailed frogs may occur along streams draining the north and south sides of the Grouse Ridge plateau. The slight changes in stream-flow patterns that may occur in streams draining off the Grouse Ridge plateau if perched headwater aquifers are disturbed during mining operations would not significantly affect these frogs. The slight changes in flow timing that may occur during mining operations would not impact riparian vegetation along these streams.

Wetlands

The wetland and streams in the Lower Site would be impacted by the construction of a passive freshwater storage pond. Impacts associated with the project activity under consideration can be mitigated by applying the mitigation sequence discussed in the Plants and Animals Technical Report, Wetland Delineation Report (Attachment D).

3.2.1.3 Alternative 2A–Upper Site Mining and Limited Lower Site Mining - Exit 34

Impacts are not likely to differ significantly from those discussed for Alternative 2. However, since there will be gravel extract from an area approximately 7.5 acres smaller than the regular option of Alternative 2, there will be a smaller impact to wildlife habitat.

3.2.1.4 Alternative 3–Lower and Upper Sites Mining - Exits 34 and 38)

Wildlife and Terrestrial Resources

Impacts are not expected to differ significantly from those discussed in Alternative 2. Operational noise from the Upper Site would be greater, increasing the potential disturbance of wildlife species at the Upper Site. This alternative would lack the proposed conveyor belt, resulting in a minimal net difference of 0.5 acres of disturbed habitat. Approximately 1.8 miles of existing roadway would have to be widened to permit truck traffic traveling in both directions. A minimum of 400 feet of additional roadway needs to be built in order to reach the upper ridge gravel deposit and 1,800 feet of road would need to be built to bypass the Washington State Patrol Fire Training Academy. Alternatives 3 and 4 would use SE Grouse Ridge Road to haul minerals from the quarry site to the Exit 38 on I-90 and thence to market. It is anticipated that a large truck or a truck/trailer combination would use the road every two minutes. This level of traffic would substantially increase truck traffic, noise, and dust above current levels. Some wildlife species may be displaced from the road corridor. However, SE Grouse Ridge Road currently supports logging traffic from Weyerhaeuser and year-round activity at the Washington State Fire Training Center. Wildlife currently using the road corridor have been exposed to traffic and noise associated with these uses.

While northern spotted owls are not known to currently nest in the forests adjacent to SE Grouse Ridge Road, if DNR manages the area as spotted owl habitat, the area, in time could become suitable nesting/foraging habitat, although this is unlikely to occur during the 25-year life of the proposed mine. The increase in truck traffic may discourage nesting/foraging adjacent to the road. This would lead to a loss of spotted owl habitat. Assuming that displacement would extend approximately 600 feet up-slope of the road, approximately 131 acres of potential spotted owl habitat would be lost during the 25 years the Upper Site is in operation.

Aquatic and Riparian Resources

Impacts on streams and riparian areas adjacent to the site are not expected to differ significantly from those discussed for Alternative 2. However, SE Grouse Ridge Road would need to be widened to meet King County road standards to permit truck traffic travel in both directions. If the road is widened,

instream work would occur at crossings 2 through 11, 13, and the portions of streams 9a and 10a flowing through roadside ditches. Six of the streams and the streams flowing through ditches are ephemeral; construction would occur during the low flow period when the channels are dry.

Depending on the extent of road widening required, several areas of upland wildlife habitat and areas of riparian, wetland and in-stream habitat may be filled and culverts extended, leading to a small net loss of habitat. Potential impacts from road construction include sediment release into stream channels, filling of wetlands, and loss of potential large woody debris recruitment. Seven of the streams (including the South Fork of the Snoqualmie River) contain fish populations.

Because the road is paved, it is unlikely that truck traffic will release any significant amount of fine sediment into the streams or wetlands.

The 400 feet of additional roadway to access the Upper Site and 1,800 feet of bypass road which may be built for this alternative would also require instream work if the roadway crosses small tributary streams. Any channels crossed would be ephemeral and will likely be dry during the construction season, reducing the potential for sediment release into fish bearing reaches downstream from road construction. All applicable Best Management Practices (BMPs) and standards and guidelines would be followed during road construction. It is unlikely that any significant release of sediment into stream channels will occur.

Wetlands

For the Lower Site, wetland impacts for Alternative 3 would be the same as for Alternative 2. The widening of SE Grouse Ridge Road may impact Wetland C, located on the north side of the road. Impacts associated with the project activity under consideration can be mitigated by applying the mitigation sequence discussed in the Plants and Animals Technical Report, Wetland Delineation Report (Attachment D).

3.2.1.5 Alternative 3A–Upper Site Mining and Limited Lower Site Mining - Exits 34 and 38

Impacts are not likely to differ significantly from those discussed for Alternative 2. However, since the Lower Site Option would extract gravel from an area approximately 7.5 acres smaller than the regular option of Alternative 2, there will be a smaller impact to wildlife habitat.

3.2.1.6 Alternative 4–Upper Site Only Mining - Exit 38

Wildlife and Terrestrial Resources

Impacts would be similar to those for Alternative 3. These impacts include the loss of habitat at the project site and along the new or widened roadway, displacement of wildlife, and impacts of operation noise on wildlife. However, elk that currently using the Lower Site for winter range would not be displaced and would not to be affected by this alternative. Because the Lower Site would not be developed, this alternative would only disturb the 231 acres (in 50-acre segments) at the Upper Site and not the 40 acres at the Lower Site, reducing the direct loss of wildlife habitat to 50 acres at any given

time. Because none of this habitat is unique, impacts from the temporary loss of habitat are expected to be low.

Aquatic and Riparian Resources

Impacts would be similar to those for Alternatives 2 and 3. In Alternative 4, construction on the Lower Site would not occur, and a portion of an ephemeral stream and its riparian zone northeast of the Lower Site would not be filled.

Wetlands

Impacts to the wetland adjacent to the SE Grouse Ridge Road would be similar to those for Alternative 3. Mining operations would not occur at the Lower Site, so the wetland there would not be affected.

3.3 IMPACTS ON THREATENED AND ENDANGERED SPECIES

3.3.1 Federally Listed Species

No Endangered, Threatened or Sensitive plant species occur in the proposed project areas. Therefore, there will be no impacts associated with the proposed project.

3.3.1.1 Bull trout *(Salvelinus confluentus)* Coastal-Puget Sound ESU

Will not be affected. The proposed project area is located above a barrier to anadromous fishes (Snoqualmie Falls). The only documented spawning populations of bull trout in the Snohomish River basin (including the Skykomish and Snoqualmie River subbasins) occur in the Skykomish River basin. Fluvial (and possibly anadromous) bull trout from the Skykomish River population are known to occur in the Snoqualmie River as far upstream as Snoqualmie Falls. Bull trout have not been documented in the Snoqualmie River basin above Snoqualmie Falls and it is unlikely that they occur in the vicinity of the proposed project area.

Bull trout have strict cold water temperature requirements, which are not present in the stream system that drains off the north side of Grouse Ridge or any of the streams crossed by SE Grouse Ridge Road. Most of the stream system draining the north side of Grouse Ridge is above barriers to the migration of any fluvial population of bull trout that may exist in the Middle Fork of the Snoqualmie River. All applicable BMPs and standards and guidelines will be followed during road widening operations on SE Grouse Ridge Road to prevent any release of sediment or temperature increase in the South Fork of the Snoqualmie River or its tributaries. The road is paved and it is unlikely that truck traffic on this road surface will release any significant amount of fine sediment into the streams. Suitable spawning habitat for bull trout does not exist in this reach of the South Fork, which is between two barrier falls. The project will not impact any possible bull trout habitat in the Snoqualmie River basin near or downstream from the proposed project area.

3.3.1.2 Northern spotted owl (*Strix occidentalis caurina*)

Will not be affected. There are no documented sightings of spotted owls within the study area. Suitable habitat for spotted owls is extremely limited in the project vicinity due to extensive timber harvesting, forest fragmentation, and human development. Forests located at the project site lack a multi-layered canopy and other habitat features found in mature or old-growth stands preferred by spotted owls.

3.3.1.3 Marbled murrelet (*Brachyramphus marmoratus*)

Will not be affected. There are no documented sightings of marbled murrelets within the study area. Suitable habitat for marbled murrelets is extremely limited in the project vicinity due to extensive timber harvesting, forest fragmentation, and human development. Forests located at the project site lack a multi-layered canopy and other habitat features found in mature or old-growth stands preferred by marbled murrelets.

3.3.2 Federal Species of Concern

3.3.2.1 California wolverine *(Gulo Luscus)*

Will not be affected. Although there have been historic sightings of wolverine in the Snoqualmie Bend Ranger District, these sightings were in the Alpine Lakes Wilderness Area. Suitable habitat for California wolverines does not occur in the project vicinity given the low elevations at or near the project site, the Lower Site's proximity to a residential area, and the lack of proximity to sub-alpine and alpine habitat.

3.3.2.2 Pacific fisher (*Martes pennati pacifica*)

Will not be affected. Fishers have been historically sighted in the North and Middle Forks of the Snoqualmie River and it is likely that these drainages may support one or more pairs of fisher. Suitable habitat for the Pacific fisher does not occur in the project vicinity given the young fragmented forests and large openings throughout the project site. The project site is also widely separated from the unfragmented habitat of the upper North and Middle Forks of the Snoqualmie River.

3.3.2.3 Long-eared myotis *(Myotis evotis)*

May affect, not likely to adversely affect. None of these bats have been documented near the study area. Suitable foraging habitat for the long-eared myotis may exist on the project site, but the lack of caves or other suitable roosting sites at the study area is likely to discourage resident populations.

3.3.2.4 Long-legged myotis *(Myotis volans)*

May affect, not likely to adversely affect. None of these bats have been documented near the study area. Suitable foraging habitat for the long-eared myotis may exist on the project site, but the lack of caves or other suitable roosting sites at the study area is likely to discourage resident populations.

3.3.2.5 Pacific Townsend's big-eared bat (*Corynorhinus townsendii townsendii*)

May affect, not likely to adversely affect. None of these bats have been documented near the study area. Suitable foraging habitat for this species may exist on the project site, but the lack of caves or other suitable roosting sites at the study area is likely to discourage resident populations.

3.3.2.6 Northern goshawk (*Accipiter gentilis*)

Will not be affected. There have been no sightings of goshawks near the study area. Suitable foraging or nesting habitat for this species is unlikely to exist at or near the project site. Breeding Bird Atlas Data shows the nearest recent nesting location in extreme eastern King County, miles from the project site (Smith et al. 1997). In addition, second growth forests at the project site are not attractive foraging locations for northern goshawks.

3.3.2.7 Olive-sided flycatcher *(Contopus cooperi)*

May affect, not likely to adversely affect. Suitable foraging and nesting habitat may occur at the site for this species. This habitat will be removed during the operation of the sites and will not be available until site restoration is completed. The habitat that will be lost is neither unique nor rare and flycatchers will be able utilize newly restored habitat as the plant communities mature to provide sufficient food and cover.

3.3.2.8 Cascade frog (*Rana cascadae*)

May affect, not likely to adversely affect. Suitable habitat for Cascade frogs is unlikely at the project site due to the lack of permanent water sources. Cascade frogs may occur along streams draining the north and south sides of the Grouse Ridge plateau. The slight changes in stream flow patterns that may occur if perched aquifers are disturbed during mining operations will not have any significant effect on Cascade frog populations.

3.3.2.9 Tailed frog (*Ascaphus truei*)

May affect, not likely to adversely affect. Suitable habitat for tailed frogs is unlikely at the project site due to the lack of permanent water sources. Tailed frogs may occur in streams draining the north and south sides of the Grouse Ridge plateau. The slight changes in stream flow patterns that may occur if perched aquifers are disturbed during mining operations will not have any significant effect on tailed frog populations.

3.3.2.10 Pacific lamprey (*Lampetra tridentata*)

Will not be affected. The study area is located above a barrier to anadromous fishes (Snoqualmie Falls). Pacific lamprey have not been documented in the Snoqualmie River basin above Snoqualmie Falls and non-anadromous populations have never been documented (Beamish and Northcote 1988).

3.3.2.11 River lamprey (*Lampetra ayresi*)

Will not be affected. The study area is located above a barrier to anadromous fishes (Snoqualmie Falls). River lamprey are strictly anadromous and have not been documented in the Snoqualmie River basin above Snoqualmie Falls.

3.4 CUMULATIVE IMPACTS

Excavation at the Upper Site may modify discharge from perched aquifers feeding the middle and east forks of the unnamed tributary of the Middle Fork of the Snoqualmie River and the stream flowing directly south of the Washington State Patrol Fire Training Academy State Fire Training Center into the South Fork of the Snoqualmie River. This could result in slightly higher spring flows and reduced flows in the summer and fall. The flow from these aquifers only contributes a small portion of the total flow in the stream reaches that support fish. Total flow from the springs ranged from 0.1 to 0.3 CFS (cubic feet per second) for streams flowing north and the same range of volumes for springs flowing into the south flowing streams. Measurements of stream flow in reaches that support fish showed no correlation with changes in spring flows from perched aquifers. Changes in spring flows fed by perched aquifers are unlikely to have significant impacts on stream volumes, fish and amphibian populations, aquatic macroinvertebrates, or beaver colonies in the lower reaches of these streams. The slight changes in flow timing that may occur during mining operations will not impact riparian vegetation along these streams. Cascade and tailed frogs may occur along streams draining the north and south sides of the Grouse Ridge plateau. The slight changes in stream-flow patterns that may occur in streams draining off the Grouse Ridge plateau if perched headwater aquifers are disturbed during mining operations would not significantly affect these frogs. The slight changes in flow timing that may occur during mining operations would not impact riparian vegetation along these streams.

Widening SE Grouse Ridge Road to accommodate truck traffic in both directions would require instream work at 12 tributaries and two roadside ditches that are classified as ephemeral streams (9a and 10a) of the South Fork of the Snoqualmie River. The channels of 7 of these tributaries would likely be dry during construction. These tributaries empty into a 1-mile reach of the river. Road widening would not remove enough canopy cover to increase water temperatures or reduce the recruitment of large woody debris in the South Fork of the Snoqualmie River significantly, but a potential for cumulative impacts on the river from multiple sources of sediment discharge does exist. Because the area of stream channel expected to be disturbed during road construction is small and all applicable BMPs and standards and guidelines will be followed during construction, it is unlikely that significant impacts to aquatic resources (fish, macroinvertebrates, amphibians) in the South Fork of the Snoqualmie River and its tributaries would occur from road construction.

Any highway has potential to degrade water quality during operation from petroleum products dripping from vehicles, tire wear, and material adhering to vehicles falling off. Storm runoff may carry these products to the tributaries of the South Fork of the Snoqualmie River. In addition, paving increases the runoff rate, thereby increasing erosion potential. Maintenance operations can contribute sediment and chemical contaminants to stormwater runoff. Using methodology developed in a University of Washington research project (Horner 1985) to determine the impacts of a projected increase of ADT (Average Daily Trips) and impervious surface in each drainage basin crossed by the SE Grouse Ridge

Road, there will be an insignificant impact to water quality and fisheries/aquatic resources from increased traffic on the SE Grouse Ridge Road. The proposed widening of the road would be required to be designed to meet water quality standards of the King County Surface Water Design Manual. Compliance with these requirements would reduce impacts from increased use of the road.

The project site is located in the foothills of the Central Cascade Mountains in eastern King County. Coniferous forests characterize this region. In the natural condition, the forests in the proposed area would have been a mixture of western hemlock and Douglas fir, depending upon specific site conditions and successional processes in the past. Second generation forests have been managed as Douglas fir plantations. These plantations are harvested in a various rotations, with the earliest harvest occurring at age 22 or 23, and a final harvest in the late 30s up the early 50s (Steve Ketz, Weyerhaeuser, 2000). The stands are replanted to Douglas fir soon after the harvest. The management of these forests results in a landscape of forest patches ranging from recent clearcuts, through seedling/sapling stages, to closed canopy, early second generation forests. These forests never develop to a stage of multi-layered vegetation, and do not include snags, diseased trees, and woody debris except as required by current forest practice regulations.

The development of the project will cause the temporary loss of 300 acres of actively managed and harvested forest plantations of low wildlife value. Once a segment of land used for mining and processing has been reclaimed, the Weyerhaeuser Company would offer to donate each segment to Washington DNR in trust for King County. The ultimate land use of the site would be consistent with the underlying Forestry designation. In view of the pattern of forest land ownership in the region, and the increased level of protection these lands will receive under current or soon to be implemented forest plans, it is unlikely that the projects would contribute to any cumulative long-term impacts in the region.

Nest sites for both northern spotted owls and marbled murrelets have been located in the region, but not in the proposed project area. Currently, the project lands are neither suitable nesting nor foraging habitat for northern spotted owls nor suitable nesting habitat for marbled murrelets. The project lands are not within a flight corridor that either species would use. No anadromous salmonids are present in or in proximity to the proposed project area, and bull trout are not known to be present in the area and would not use any waters within the area if they were present.

Due to concerns for water quality, fisheries, and wildlife (especially endangered species), management of large areas of both public and private forestlands are currently being changed. Federal lands in the Mount Baker Snoqualmie National Forest are now managed in conformance to the Northwest Forest Plan. This plan substantially alters the level of harvest, protects riparian areas and much of the forest in the central Cascades, and alters management practices, largely eliminating even-age management and clearcut harvests.

Concurrently, management of much of private, state, and municipal forest has been modified due to the concerns for threatened and endangered wildlife. Under the Endangered Species Act, forest management plans have been developed that provide for the protection of threatened and endangered species. Such Plans, termed Habitat Conservation Plans (HCP), are currently being implemented for Plum Creek's Central Cascade forest lands, the City of Seattle's Cedar River Watershed and DNR forest lands. Additionally, King County park and wildlife lands, State park and wildlife lands are being managed to

become near natural forestlands. The valley bottom lands around the cities of North Bend and Snoqualmie are rapidly becoming urbanized, and rural residential lands are developing on their perimeters, for example along the east slopes of Rattlesnake Ridge. Nevertheless, the preponderance of lands within the region (within 10 miles) are now covered either by the Northwest Forest Plan (federal lands), by HCPs prepared under the Federal Endangered Species Act as administered by the USFWS and the National Marine Fisheries Service, or are being maintained as natural open space either by the state or King County. Thus, to the north, Mount Si and lands to the east are now covered by the Northwest Forest Plan and are contiguous with the Snoqualmie National Forest. To the South, the headwaters of the Cedar River are covered by the City of Seattle's HCP. Private forestlands along the I-90 corridor are covered by Plum Creek's HCP. To the west, Rattlesnake Ridge is protected as in WDNR's Rattlesnake Ridge open space, and in the lowlands to the northwest, the County's Three Forks Park protects riparian lands at the conjunction of the North, Middle, and South Forks of the Snoqualmie River.

3.5 SUMMARY OF MITIGATION MEASURES

3.5.1 Alternative 1–No Action

If Weyerhaeuser continues to manage the Lower and Upper Sites as timberlands (with the existing gravel quarry on the Lower Site), these activities would follow standards and guidelines in the Forest Practice Act as administered by the WDNR.

3.5.2 Alternatives 2, 2A, 3, 3A and 4 (Including Limited Lower Site Mining)

From the perspectives of both wildlife management and forest production, active management of the buffer lands and the restored mine lands will improve conditions more quickly than would planting and no management activities (Carey et al. 1997). Fertilizing, precommercial thinning, commercial thinning and other forest practices can improve the health and vigor of the forest and concurrently improve wildlife habitat.

3.5.2.1 Buffer, Forest and Reclamation Areas

The proposed mining plan should provide for effective protection of lands that are not in the mining phase by fencing, road configuration, signage, and other measures. Lands that are not in the mining phase should be protected from casual use either by the mining operation or the public, i.e. they would not used for stockpiling mined material or as casual haul routes, and they would not become recreation areas for off-road vehicles. The mining plan should also protect the existing timber stands that provide high value wildlife habitat.

3.5.2.2 Recover and Stockpile Topsoils and Woody Debris

Topsoil should be salvaged before mining operations at each mine segment begins and be spread over the fill. The living organisms which facilitate the decomposition of raw materials and assist in the uptake of minerals and nutrients for living plant species require air and water and do not survive prolonged burial at depth. The continual restoration of completed mine segments should allow "living topsoil," inclusive with organic debris, to be replaced in the shortest period of time. During reclamation and restoration, a goal of at least 5 pieces of large woody debris (>10 inches in diameter and more than 15 feet long or the

root wad of a similar sized tree) should be placed per acre. Screening berms and mined area should be top-dressed with topsoil prior to planting. Based upon an assessment by a forester, soil scientist, or other trained restoration specialist, soil amendments may be required prior to planting. In addition, forage areas for deer and elk should be planted to minimize conflicts with neighboring land uses.

3.5.2.3 Deer and Elk Passes

In Alternatives 2 and 2A, the proposed conveyor system extending from the Lower Site to the Upper Site will be built so low to the ground, that deer and elk may not be able pass under the conveyor. Two forest management roads that currently cross the proposed alignment should be retained and underpasses for the roads should be constructed. These underpasses will likely be used by deer and elk.

3.5.2.4 Revegetation Plans

Revegetation seed mixes in the reclamation plant should include a broad pallet of plant species that provide benefits to wildlife. WDFW should be consulted regarding appropriate seed mixes. The King County Noxious Weed Control Program should be consulted regarding the management of noxious weeds during the revegetation portion of the reclamation process. Some forest areas should be planted with a mix of conifer species in addition to Douglas fir. Screening buffers, stream and wetland buffers, forested wetlands, and other locations of opportunity should include plantings of western red cedar, Sitka spruce, silver fir, grand fir, and other appropriate species so that pocket stands of diverse forest can develop over time.

3.5.2.5 Bird Nests

In order to minimize the loss of bird nests, eggs or juveniles, areas that are to be cleared for mining should not be cleared during the nesting season from April 1st through June 30th.

3.5.2.6 Pond Design

Pond design should include contemporary pond construction concepts to enhance aesthetics and provide wildlife habitat. A variety of native plants should be installed along the pond shoreline and immediately upslope. Emergent herbaceous vegetation such as rushes and other native herbaceous plants tolerant of widely fluctuating water regimes should be planted in these areas to enhance aquatic habitat and shoreline stability.

3.5.2.7 Wetlands

Impacts associated with the project activity under consideration should be mitigated by applying the commonly accepted mitigation sequence detailed in the Wetland Delineation Report in the Plants and Animals Technical Report (Attachment D). The sequence is as follows: avoidance, minimization, rectification, and compensation. Since the wetland located in the Lower Site (Wetland A) is a non-isolated wetland according to King County Code (KCC) 21A.06.1410 and impact avoidance is apparently feasible, direct impacts to these areas from building construction or landscape modification cannot be permitted by King County. If feasible, the freshwater storage pond must be constructed in the Lower Site to avoid impacts to Wetland A and the stream and seep located on the Lower Site. If complete avoidance

of the wetland is determined not feasible, then mitigation of wetland impacts should be minimized as much as possible. King County Sensitive Areas Ordinance (SAO) requires that the amount of wetland impacted after minimization be replaced using compensatory mitigation.

3.5.3 Alternative 3 (Including Limited Lower Site Mining

Mitigation measures would be the same as those identified for Alternative 2. In addition, road construction and widening on SE Grouse Ridge Road should follow all applicable BMPs and standards and guidelines at stream crossings to avoid, minimize, or eliminate impacts to the aquatic environment due to the release of sediment into streams. Methods used should include the following measures:

- Effective sediment barriers should be constructed at approaches to stream channels.
- Construction should occur during periods of low flow before adult salmonids return to their spawning beds and after the emergence of salmonid fry from the gravel.
- The construction corridor through streams and riparian areas should be kept as narrow as possible.
- Disturbance to stream banks, existing channels, and riparian areas should be minimized.
- Machine activity in streambeds should be kept to an absolute minimum.
- Culverts at crossings of fish-bearing streams that present a barrier to fish passage will be replaced with culvert designs that allow fish passage to habitat above and below the road.
- Streambanks should be stabilized and re-vegetated after construction is completed. Riparian and aquatic habitats should be restored within one or two growing seasons to mitigate for impacts from road widening, or replace habitat lost during construction.
- Riparian trees removed during construction should be placed in the stream channel with their root wads intact to provide instream habitat for fish and control sediment transport.
- Increases in base-line turbidity should be monitored during construction and construction stopped if turbidity levels exceed a percentage of the base-line levels agreed to with the relevant federal, state, and local agencies.

3.5.3.1 Wetlands

Widening SE Grouse Ridge Road should not impact Wetland C, located just north of the road. The wetland is adjacent to the road shoulder for approximately 50 lineal feet. The existing road width of the section adjacent to Wetland C appears sufficient for truck travel. Widening should be minimal and should occur only on the south side of the road. If complete avoidance of the wetland is determined not feasible, then mitigation of wetland impacts should be minimized as much as possible. King County Sensitive Areas Ordinance (SAO) requires that the amount of wetland impacted after minimization be replaced using compensatory mitigation.

3.5.4 Alternative 4–Upper Site Mining - Exit 38

Mitigation measures would be the same as those identified for Alternative 3.

3.6 SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS

3.6.1 Alternative 1–No Action

No significant unavoidable impacts will occur.

3.6.2 Alternative 2–Proposal: Lower and Upper Sites Mining - Exit 34

The temporary loss of approximately 300 acres of wildlife habitat at the Lower and Upper Sites will occur. Habitat at the Lower and Upper Sites is composed primarily of coniferous forests in the early seral stages of regeneration. This habitat is not rare or unique and a temporary loss of this habitat would not be considered a significant adverse impact. Impacts to wildlife habitat would be mitigated by reclaiming each 50-acre segment of the mining operation upon completion of gravel extraction and returning the segments to their pre-mining use of timber production, avoiding a significant adverse impact to wildlife habitat. No more than 90 acres (50-acre segment on the Upper Site and the 40-acre Lower Site) will be lost as wildlife habitat at any time.

Mitigation of wetland impacts will be in the form of avoidance. All impacts on wetlands that cannot be avoided or minimized must be compensated in accordance with the King County Sensitive Areas Ordinance (SAO).

3.6.3 Alternative 3–Lower and Upper Sites Mining - Exits 34 and 38

The temporary loss of approximately 300 acres of wildlife habitat at the Lower and Upper Sites and permanent habitat loss due to road construction and road widening is considered an unavoidable adverse impact. The Lower and Upper Sites will be reclaimed as stated above under Alternative 2, avoiding a significant adverse impact to wildlife habitat. If in-stream work is required during road widening, all applicable BMPs and standards and guidelines will be followed to avoid, minimize, or eliminate impacts on the aquatic environment to avoid significant adverse impacts to aquatic habitat. Depending upon the extent of road widening required, several acres of upland wildlife habitat and less than 2,000-feet of riparian and in-stream habitat will be filled and culverts will be extended, leading to a small net loss of streambed habitat. All applicable BMPs and standards and guidelines will be followed to control erosion and revegetate any roadside habitat impacted during road construction. This small area of permanently impacted habitat would not be considered a significant adverse impact. Impacts to streams would be mitigated to achieve the "no net loss" goal required by King County Code.

It may be possible to avoid impacts to wetlands by expanding the road away from the wetlands. All impacts to wetlands that can not be avoided or minimized must be compensated according to the King County Sensitive Areas Ordinance (SAO).

3.6.4 Alternative 4–Upper Site Mining - Exit 38

Impacts are the same as Alternative 3, but apply to the Upper Site only.

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APPENDIX A

AGENCY CORRESPONDENCE

The information contained in this Appendix is on file with King County.

APPENDIX B

KING COUNTY SPECIES HABITAT MATRIX (1987)

King County Species-Habitat Matrix (1987) Legend

Status
F – Federal
S – State
E – Endangered
T – Threatened
C – Candidate
SOC – Species of Concern
M – Monitor
G – Game

Seasonality in Western Washington
R – Resident
M – Migrant
W – Winter
S – Summer
F – Fall

Abundance in Western Washington
C – Common
U – Uncommon
R - Rare

Species Occurrence
D – species detected or observed on the property
E – species expected or regularly occurring in the habitat
R – species reported by local residents on site or in vicinity
A – species reported by local residents to occur on adjacent property or in vicinity
* - species present within the region (King County 1987), but not expected to regularly occur on the property
F – species present within the region, not expected under current conditions, but possible future "expected" species.

Habitat Codes
0 – specific habitat not identified
** - aerial feeder

Freshwater Habitats
10 – ponds
11 – shrub wetland
12 – freshwater marsh
14 – wet meadow
15 – forested wetland
16 – rivers and streams

Riparian Habitats
17 – riparian forest
18 – riparian shrub/forb

Upland Habitats
19 – lowland grass/forb
    a – grass/forb successional stage
    b – unmowed, stable (pastures)
    c – mowed, stable (lawns)
21 - lowland shrub
24 – second growth lowland forest
    a – coniferous
    b – deciduous
    c - mixed

			FRESHWATER							RIPARIAN		UPLAND						
	STATUS	S/A	0	10	11	12	14	15	16	17	18	19a	19b	19c	21	24a	24b	24c
AMPHIBIANS																		
Northwestern Salamander				E		E	E	E		E					E	E	E	E
Long-toed Salamander				E		E	E	E		D	E	E			E	E	E	E
Pacific Giant Salamander				E					E	E		E				E	E	E
Rough-skinned Newt				D		E	E			D	D	E			E	E	E	E
Ensatina										E						E	E	E
Western Red-backed Salamander								E		E						E	E	E
Tailed Frog	FSOC								E									
Western Toad	FSOC			E		E	E	E		E	E	E			E	E	E	E
Pacific Treefrog				D	E	E	E	E		D	D	D			E	E	E	E
Red-legged Frog	FC			E	E	E	E	E	E	D	E				E	E	E	E
Cascades Frog	FSOC			*		*	*											
Detected			0	2	0	0	0	0	0	5	2	1	0	0	0	0	0	0
Expected/Detected			0	7	2	6	6	6	3	9	5	5	0	0	6	9	9	9
Future			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
***			0	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0
REPTILES																		
Northern Alligator Lizard												D			E	E	E	E
Rubber Boa												E			E	E	E	E
Common Garter Snake				E	E	E	E	E		E	D	D			E	E	E	E
Western Garter Snake				E	E	E	E	E	E	E	E	E	E		E	E	E	E
Northwestern Garter Snake							E			E	D	D	E		E	E	E	E
Detected			0	0	0	0	0	0	0	0	2	3	0	0	0	0	0	0
Expected/Detected			0	2	2	2	3	2	1	3	3	5	2	0	5	5	5	5
Future			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
***			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BIRDS																		
Bald Eagle	FST	R/C	E							E	E							
Northern Harrier		R/U		E		E	E					E	E					
Sharp-shinned Hawk		R/U								E						E	E	E
Cooper's Hawk		R/U								E						E	E	E
Red-tailed Hawk		R/U				E		E		E		D	E			D	D	D
Rough-legged Hawk		W/C										E	E					
Northern Goshawk	FSOC	R/U																
American Kestrel		R/C										E	E					
Merlin	SM	W/U					E			E			E			E		E
Ring-necked Pheasant (1)		R/C										*	*					
Ruffed Grouse		R/C						E		D					E	E	E	D
Blue Grouse		R/C																D
California Quail (1)		R/U									E	E	E		E			
Killdeer		R/C		E			E					E						
Marbled Murrelet	F	R/R																
Rock Dove (1)		R/C											E	E				
Band-tailed Pigeon	SG	R/U														D	E	D
Mourning Dove		S/C										E						
Barn Owl		R/U								*						*	*	*
Western Screech-Owl		R/U						*		*							E	E
Great Horned Owl		R/C	E					E		E						E	E	E
Northern Spotted Owl	FT	R/R																
Northern Pygmy-Owl		R/C														E		
Barred Owl	SM	R/U								E						E	E	E
Short-eared Owl		R/U					*						*					
Northern Saw-whet Owl		R/C								E					E	E	E	E
Common Nighthawk		S/C	*															

			FRESHWATER							RIPARIAN		UPLAND						
	STATUS	**S/A**	**0**	**10**	**11**	**12**	**14**	**15**	**16**	**17**	**18**	**19a**	**19b**	**19c**	**21**	**24a**	**24b**	**24c**
Vaux's Swift	SC	S/C																
Rufous Hummingbird		S/C								E	E	E			E	E	E	E
Belted Kingfisher		R/C		E	E				D		E							
Red-breasted Sapsucker		S/C				E	E	E		E				E	E	E	E	D
Downy Woodpecker		R/C						E		E	E				E	E	E	E
Hairy Woodpecker		R/C			E		E								E	E	E	E
Northern Flicker		R/C						E		E		E	D	E	E		E	E
Pileated Woodpecker	SC	R/U		E			E	E							E	D	E	E
Western Wood Pewee		S/U														E	E	E
Olive-sided Flycatcher		S/C								E						E		
Willow Flycatcher		S/C						E		E	E				E	E	E	
Hammond's Flycatcher		S/U						E		E	E				E		E	
Pacific-slope Flycatcher		S/C								E						E	E	E
Eastern Kingbird		S/C								E	E			E	E			
Horned Lark		R/U										*	*					
Purple Martin*	SC	S/U	*															
Tree Swallow*			*															
Violet-green Swallow		S/C										D	E					
Northern Rough-winged Swallow*		S/C	*															
Bank Swallow*		M/C	*															
Cliff Swallow*		S/C										D	E	E				
Barn Swallow*		S/C										E	E	E				
Steller's Jay		R/C						E		E				E	E	E	E	D
American/Northwestern Crow		R/C		E			E	E		D		E	D	E	E	E	E	D
Common Raven		R/C										E	E			E		
Black-capped Chickadee		R/C						E		E	E				E	E	E	E
Chestnut-backed Chickadee		R/C		E	E			E		E						E	E	E
Bushtit		R/C						E		E	E		E		E	E	E	
Red-breasted Nuthatch		R/C			E			E		E						E		E
Brown Creeper		R/C								E						E	E	E
Bewick's Wren		R/C			E	E		E		E	E				E		E	
Winter Wren		R/C			E			E		E	E		E		E	D	E	D
Marsh Wren		R/C			E	E												
American Dipper		R/C							E									
Golden-crowned Kinglet		R/C			E			E		E					E	E	E	E
Ruby-crowned Kinglet		W/C						E		E	E				E	E	E	E
Townsend's Solitaire		W/U													E	E		
Swainson's Thrush		S/C	E					E		E						E	E	E
Hermit Thrush		M/W													E	E		E
American Robin		R/C				E	E	E		D	D	D	E	E	E	E	E	D
Varied Thrush		W/C						E		E	E					E	E	D
Walter Pipit		W/C		E			E					E	E					
Bohemian Waxwing		W/U														E		E
Cedar Waxwing		S/C						E		E	E				E		E	E
Northern Shrike		W/U										E	E					
European Starling (1)		R/U						E		E		D	E	E			E	E
Solitary Vireo		S/C														E	E	E
Hutton's Vireo		R/C													E	E	E	E
Warbling Vireo		S/U													E	E	E	E
Red-eyed Vireo		S/C						E		E							E	
Orange-crowned Warbler		S/C						E		E	E				E		E	
Yellow Warbler		S/C			E			E		E	E				E		E	
Yellow-rumped Warbler		M/C						E		E						E	E	E
Black-throated Gray Warbler		S/C						E		E						E	E	E
Townsend's Warbler		S/C								E						E		
MacGillvray's Warbler		S/C			E			E		E	E				E	E	E	E

			FRESHWATER							RIPARIAN		UPLAND						
	STATUS	**S/A**	**0**	**10**	**11**	**12**	**14**	**15**	**16**	**17**	**18**	**19a**	**19b**	**19c**	**21**	**24a**	**24b**	**24c**
Hermit Warbler		S/C													*	*	*	*
Common Yellowthroat		S/C			E	E		E							E			E
Wilson's Warbler		S/C						E		E	E				E		E	E
Western Tanager		S/C														E	E	D
Black-headed Grosbeak		S/C						E		E							E	
Rufous-sided Towhee		R/C			E	E		E		D	D				E	E	E	E
American Tree Sparrow		W/U													*			
Chipping Sparrow		S/C										*	*	*	*			
Vesper Sparrow		S/U										*	*		*			
Savannah Sparrow		R/C										E	E	E				
Fox Sparrow		R/C						E		E	E				E		E	
Song Sparrow		R/C			E	E		E		D	D	D	D	D	E		E	D
Lincoln's Sparrow		M/C			*						*	*			*			
Golden-crowned Sparrow		W/C									E	E			E			
White-crowned Sparrow		R/C									E	D			E			E
Dark-eyed Junco		R/C						E		E	E	D	E	E	E	E	E	E
Lapland Longspur		W/U					*					*	*					
Red-winged Blackbird		R/C		D	E	E	E	E				E	E					
Western Meadowlark		R/C										*	*					
Northern Oriole		S/C						E			E				E	E	E	E
Yellow-headed Blackbird		M/U				*	*											
Brewer's Blackbird		R/C					E					E	E					
Brown-headed Cowbird		S/C						E		E	E	E	E		E	E	E	E
Northern Oriole		S/C								E								
Purple Finch		R/C						E		D						E	E	D
House Finch		R/C								E	E	E			E		E	
Red Crossbill		R/C													E	E		
Pine Siskin		R/C						E		E					E		E	E
American Goldfinch		S/C						E		E	E	D	E		E		E	
Evening Grosbeak		R/C	E							E						E	E	E
House Sparrow (1)		R/C											E	E	E			
Detected			0	1	0	0	0	0	1	6	3	9	3	1	0	4	1	13
Expected/Detected			4	8	14	10	11	43	1	51	29	23	24	13	44	47	56	43
Future			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
***			4	0	1	1	3	1	0	2	1	7	4	1	2	2	2	2
MAMMALS																		
Common Opossum (1)						E				E			E	E	E	E	R	E
Trowbridge's Shrew																E		
Vagrant Shrew							E			E	E	E	E		E			
Dusky Shrew										E						E	E	E
Northern Water Shrew				E					E									
Pacific Water Shrew				E		E	E		E		E							
Shrew-mole										E	E	E			E	E	E	E
Townsend's Mole											E	E	E	E	E	E	E	
Pacific Mole												E	E	E	E	E	E	E
Little Brown Myotis*			*															
Yuma Myotis*			*															
Long-eared Myotis*			*															
California Myotis*			*															
Silver-haired Bat*			*															
Big Brown Bat*			*															
Hoary Bat*			*															
Snowshoe Hare								E		E	E	D			E	E	E	D
Eastern Cottontail (1)		R/C	E							E	E	E			E		D	
Aplodontia		R/C								E					E	E	E	D
Townsend's Chipmunk		R/C														R	R	D,R
Eastern Gray Squirrel (1)														E	E			
Douglas's Squirrel		R/C					E									E	E	D

			FRESHWATER							RIPARIAN		UPLAND						
	STATUS	**S/A**	**0**	**10**	**11**	**12**	**14**	**15**	**16**	**17**	**18**	**19a**	**19b**	**19c**	**21**	**24a**	**24b**	**24c**
Northern Flying Squirrel			E							E						E	E	E
Pacific Fisher	FSOC	R/R																
Beaver				D						D								
Deer Mouse										E	E	E	E		E	E	E	E
Bushy-tailed Woodrat																E	E	E
Southern Red-backed Vole															E	E		
Townsend's Vole												E	E		E			
Long-tailed Vole												E			E			
Water Vole									E									
Creeping Vole										E					E	E	E	E
Muskrat				E	E	E			E		E							
California Wolverine	FSOC	R/R																
Pacific Jumping Mouse							E	E		E	E	E			E			
Porcupine			E														R	E
Black Bear										E	E	R			E	E	E	E
Raccoon				E				E	E	E			E	E		E	R	E
Ermine											E				E	E	E	E
Long-tailed Weasel										E	E				E	E	E	E
Mink	SG			E	E	E		E	E	E	E							
River Otter				E					E									
Spotted Skunk										E	E	E	E		E			
Striped Skunk										E	E	D	E		E	E	E	E
Coyote						E		E		E	E	E	E		E	E	E	D
Red Fox										E	E	E			E	E	E	E
Mountain Lion			E															
Bobcat								E		E						E	D	E
Elk	SG						*	*		*	*	D			A	A	A	D
Columbian Black Tailed Deer	SG				E		E	E		E	E	D	E		E	E	E	D
Detected			0	1	0	0	0	0	0	1	0	4	0	0	0	0	2	7
Expected/Detected			4	6	3	5	5	7	7	21	18	17	11	5	18	25	25	23
Future			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
***			7	0	0	0	1	1	1	0	1	1	0	0	0	0	0	0
DOMESTIC ANIMALS																		
Domestic Dog					E		E	E		E	E		E	E	E	E	E	E
Domestic Cat													E	E	E	E	E	E
Detected			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Expected/Detected			0	0	1	0	1	1	0	1	1	0	2	2	2	2	2	2
Future			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
***			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL NUMBER OF SPECIES																		
Detected			0	4	0	0	0	0	1	12	7	17	3	1	0	4	3	20
Expected/Detected			8	23	22	23	26	59	12	85	56	50	39	20	75	88	97	82
Future			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
***			1	1	1	2	5	2	1	2	2	8	4	1	2	2	2	2

APPENDIX C

VEGETATION COVER TYPE TABLES

Lower Site

	Lower Site 115.0 acres	Alt 1 no action (acres)	Alt 2 proposal (acres)	Alt 2A (acres)	Alt 3 upper/ lower (acres)	Alt 3A (acres)	Alt 4 upper (acres)
Cover Type Areas with mine operations 40 acres disturbed							
	Clearcut	0.0	0.0	0.0	0.0	0.0	0.0
	Seedling/Shrub	2.0	2.0	2.0	2.0	2.0	2.0
	Sapling	98.0	71.2	75.7	71.2	75.7	98.0
	Pole	0.0	0.0	0.0	0.0	0.0	0.0
	Early Mature	0.0	0.0	0.0	0.0	0.0	0.0
	Mature	0.0	0.0	0.0	0.0	0.0	0.0
	Unvegetated / Bare / Mine	15.0	40.0	33.5	40.0	33.5	15.0
	Open Water	0.0	3.8	3.8	3.8	3.8	0.0
	Total	**115.0**	**115.0**	**115.0**	**115.0**	**115.0**	**115.0**
25 years after mine decommission							
	Clearcut	0.0	0.0	0.0	0.0	0.0	0.0
	Seedling/Shrub	0.0	0.0	0.0	0.0	0.0	0.0
	Sapling	0.0	0.0	0.0	0.0	0.0	0.0
*	Pole	115.0	111.2	111.2	111.2	111.2	115.0
	Early Mature	0.0	0.0	0.0	0.0	0.0	0.0
	Mature	0.0	0.0	0.0	0.0	0.0	0.0
	Unvegetated / Bare / Mine	0.0	0.0	0.0	0.0	0.0	0.0
	Open Water	0.0	3.8	3.8	3.8	3.8	0.0
	Total	**115.0**	**115.0**	**115.0**	**115.0**	**115.0**	**115.0**

* Commercial forest: subject to pre-commercial and commercial thinning, clearcut harvest and other forest practices.

Upper Site

	Upper Site 578.0 acres	Alt 1 no action (acres)	Alt 2 proposal (acres)	Alt 2A (acres)	Alt 3 upper/ lower (acres)	Alt 3A (acres)	Alt 4 upper (acres)
Cover Type Areas with mine operations 260 acres disturbed							
	Clearcut	0.0	0.0	0.0	0.0	0.0	0.0
	Seedling/Shrub	134.0	14.0	14.0	14.0	14.0	14.0
	Sapling	236.0	126.0	126.0	126.0	126.0	126.0
	Pole	185.0	157.0	157.0	157.0	157.0	157.0
	Early Mature	0.0	0.0	0.0	0.0	0.0	0.0
	Mature	23.0	21.0	21.0	21.0	21.0	21.0
	Unvegetated / Bare / Mine	0.0	260.0	260.0	260.0	260.0	260.0
	Open Water	0.0	0.0	0.0	0.0	0.0	0.0
	Total	**578.0**	**578.0**	**578.0**	**578.0**	**578.0**	**578.0**
25 years after mine decommission							
	Clearcut	0.0	0.0	0.0	0.0	0.0	0.0
	Seedling/Shrub	0.0	0.0	0.0	0.0	0.0	0.0
	Sapling	0.0	0.0	0.0	0.0	0.0	0.0
*	Pole	578.0	578.0	578.0	578.0	578.0	578.0
	Early Mature	0.0	0.0	0.0	0.0	0.0	0.0
	Mature	0.0	0.0	0.0	0.0	0.0	0.0
	Unvegetated / Bare / Mine	0.0	0.0	0.0	0.0	0.0	0.0
	Open Water	0.0	0.0	0.0	0.0	0.0	0.0
	Total	**578.00**	**578.00**	**578.00**	**578.00**	**578.00**	**578.00**

* Commercial forest: subject to pre-commercial and commercial thinning, clearcut harvest and other forest practices.

Conveyor Belt Corridor
3063 feet between upper and lower parcels, conveyor corridor right of way is 20 feet wide. Assumes buried freshwater and process water pipeline require no additional right of way.

	Conveyor Belt Corridor 1.4 acres	Alt 1 no action (acres)	Alt 2 proposal (acres)	Alt 2A (acres)	Alt 3 upper/ lower (acres)	Alt 3A (acres)	Alt 4 upper (acres)
Mine operations 1.4 acres disturbed							
	Clearcut	0.0	1.4	1.4	1.4	1.4	1.4
	Seedling/Shrub	0.0	0.0	0.0	0.0	0.0	0.0
	Sapling	1.0	0.0	0.0	0.0	0.0	0.0
	Pole	0.4	0.0	0.0	0.0	0.0	0.0
	Early Mature	0.0	0.0	0.0	0.0	0.0	0.0
	Mature	0.0	0.0	0.0	0.0	0.0	0.0
	Unvegetated / Bare / Mine	0.0	0.0	0.0	0.0	0.0	0.0
	Open Water	0.0	0.0	0.0	0.0	0.0	0.0
	Total	**1.4**	**1.4**	**1.4**	**1.4**	**1.4**	**1.4**
25 years after mine decommission							
	Clearcut	0.0	0.0	0.0	0.0	0.0	0.0
	Seedling/Shrub	0.0	0.0	0.0	0.0	0.0	0.0
	Sapling	0.0	0.0	0.0	0.0	0.0	0.0
*	Pole	1.4	1.4	1.4	1.4	1.4	1.4
	Early Mature	0.0	0.0	0.0	0.0	0.0	0.0
	Mature	0.0	0.0	0.0	0.0	0.0	0.0
	Unvegetated / Bare / Mine	0.0	0.0	0.0	0.0	0.0	0.0
	Open Water	0.0	0.0	0.0	0.0	0.0	0.0
	Total	**115.0**	**115.0**	**115.0**	**115.0**	**115.0**	**115.0**

APPENDIX D

WETLAND DELINEATION REPORT

1.0 INTRODUCTION

URS Corporation conducted an investigation to determine the presence, extent, character of wetlands and streams within the Lower Site and along SE Grouse Ridge Road of the proposed North Bend Gravel Operation construction site. The study area is located within Sections 19, 27, 28 and 34 of Township 23 North, Range 9 East in unincorporated King County, Washington.

The purpose of the investigation was to verify findings of the reconnaissance-level investigation conducted on October 15, 1999 and April 20, 2000 by URS/Dames & Moore as reported in the Draft Environmental Impact Statement for the North Bend Gravel Operation (URS, 2000). The investigation included a delineation of wetland areas and a survey of streams in the proposed project area. This report documents the work performed, describes the site's wetland and upland areas, and characterizes the streams found within the study area. It also identifies discrepancies between the wetland reconnaissance and wetland delineation findings.

The North Bend Gravel Operation proposal includes two separate sites east of North Bend, in unincorporated King County. The 115-acre Lower Site is situated at the foot of Grouse Ridge, north of Interstate 90 and east of 468th Avenue SE. In the proposed plan, an operations/processing plant occupying 25 acres would be constructed, a 3.8-acre freshwater storage pond would be constructed, and gravel mining operations would occur on this site. The 578-acre Upper Site is located at the top of Grouse Ridge, at an elevation of approximately 1,600 feet. Complete descriptions of the alternatives are included in Chapter 2 of the FEIS. In Alternatives 3 and 4, the Upper Site would be accessed from the southeast by SE Grouse Ridge Road (also known as the Washington State Patrol Fire Training Academy Route and the Fire Service Center Road) located southeast of Grouse Ridge. This would require widening the road to accommodate two lanes of gravel truck traffic. The wetland reconnaissance found wetland areas in the Lower Site and along SE Grouse Ridge Road, but none in the area of the Upper Site. The wetland delineation investigation described in this report was conducted in the Lower Site and the SE Grouse Ridge Road on October 19 & 20, 2000.

2.0 METHODS

2.1 SENSITIVE AREAS DETERMINATION

The King County Code (KCC) defines and regulates development impacts to sensitive areas in unincorporated areas of King County. According to King County Code 21A.24, sensitive areas are lands which are subject to natural hazards or which support certain unique, fragile or valuable environmental features such as wildlife and its habitat. These areas include lands at high risk for erosion, landslides, earthquakes or flooding; those underlain by coal mines; and wetlands or lands adjoining streams, rivers and other water bodies. Field investigations to identify and characterize sensitive areas were conducted on site by URS biologists during a reconnaissance visit on October 15, 1999 and April 20, 2000, and during a delineation investigation on October 19-20, 2000.

Documents reviewed to aid determination of sensitive areas including wetlands and streams in the study area and its vicinity are as follows:

- National Wetlands Inventory Map, Chester Morse Lake area, Washington quadrangle (US Fish and Wildlife Service, 1987)
- Priority Habitat and Species (PHS) database results for Sections 19, 27, 28, & 34 of Township 23 North, Range 9 East (Washington Department of Fish and Wildlife, 2000)
- Natural Heritage Program (NHP) database results for Sections 19, 27, 28, & 34 of Township 23 North, Range 9 East (Washington Department of Natural Resources, 2000)
- Soil Conservation Service (SCS), Soil Survey of Snoqualmie Pass Area, Parts of King and Pierce Counties, Washington, December 1992
- USGS Geological Topographic Survey: Chester Morse Lake area, Washington quadrangle (1989)
- Aerial photographs (Janikowski Oost & Associates, March 7, 2000. Flight date of photographs, August 27, 1999)

2.2 WETLAND DELINEATION

Wetland determination and delineation was made on site by URS Corporation wetland biologists using the 1987 U. S. Army Corps of Engineers (Corps) Wetlands Delineation Manual and the 1997 Washington State (State) Wetland Identification and Delineation Manual. The Washington Department of Ecology (Ecology) 1997 methodology was developed to be consistent with the Corps 1987 Manual. As required by state law, the State of Washington has adopted this manual. All delineated and surveyed wetland boundaries are subject to verification and approval.

For regulatory purposes, wetlands are defined as:

Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically

adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

According to the manual, the following three characteristics usually must be present for an area to be identified as a wetland: (1) hydrophytic vegetation, (2) hydric soil, and (3) wetland hydrology. Hydrophytic vegetation consists of those plant species growing in water, soil, or on a substrate that at least periodically lacks oxygen. Hydric soils are saturated, flooded, or ponded long enough during the growing season to become deoxygenated in the upper soil horizon. Wetland hydrology includes seasonal, periodic or permanent inundation or soil saturation that creates anaerobic conditions in the soil for a sufficient portion of the growing season for wetland soil and vegetation to be maintained.

At least one sample plot was established in each wetland and its respective adjacent upland area. The presence or absence of hydrophytic vegetation, hydric soil, wetland hydrology, and other wetland indicators were documented for each sample plot.

2.2.1 Hydrophytic Vegetation

The dominant plant species in each vegetation community were identified. Vegetation communities are defined here as a contiguous assortment of plants in a given area sharing similar environmental conditions. Dominant plants are those plant species that comprise at least 20 percent aerial cover of a given plot. Plots are circular and have a 30-foot radius for trees and shrubs and a 5-foot radius for herbaceous plants. Plots were situated so that they best represent the vegetation present within each community.

The wetland indicator status for each dominant species as designated by the US Fish and Wildlife Service (USFWS) (Reed 1988, 1993) for Region 9 was used to determine whether the vegetation in each community is hydrophytic. To meet the hydrophytic vegetation criteria, more than 50% of the dominant species must have an indicator status of obligate, facultative wetland, and/or facultative. Indicator categories and hydrophytic vegetation classification are defined in Table 1.

TABLE 1
PLANT SPECIES WETLAND INDICATOR CATEGORIES

Indicator Category	Occurrence	Probability in Wetlands (estimated)
Obligate (OBL)	Occurs almost always in wetlands under natural conditions.	>99%
Facultative Wetland (FACW)	Usually occurs in wetlands, but occasionally found in non-wetlands.	67-99%
Facultative (FAC)	Equally likely to occur in non-wetlands or wetlands.	34-66%
Facultative Upland (FACU)	Usually occurs in non-wetlands, but occasionally found in wetlands.	1-33%
Upland (UPL)	Almost always occurs under natural conditions in non-wetlands in this region, but may occur in wetlands in another region.	<1%

2.2.2 Hydric Soil

Soil observations were made in wetlands and adjacent upland areas by digging 1.5-foot deep soil profiles in each sample plot. Soil color and other characteristics used to indicate hydric soils were documented. Soil taxonomy and drainage class were determined by reviewing the results of the Soil Survey of Snoqualmie Pass Area, Parts of King and Pierce Counties, Washington (United States Department of Agriculture <USDA>, 1992).

Soil in which any of the following indicators is present meets the criteria for hydric soil:

- Gleyed soil (gray colors). Gleyed soils develop when mineral soil is saturated or inundated for sufficient periods of time to result in anaerobic (no oxygen) conditions. Anaerobic conditions cause elements common in soil, such as iron and manganese, to exist in reduced forms that are usually bluish, greenish, or grayish in color. Soil colors are determined using a Munsell color chart (Kollmorgen Corporation, 1995), which has separate pages for gley colored soils.
- Low chroma matrix. A low chroma matrix develops when mineral soil is saturated or inundated for substantial periods of time during the growing season (but not long enough to produce gleyed soil) to result in anaerobic (no oxygen) or hypoxic (low oxygen) conditions. A soil matrix is the portion of a given soil layer (usually more than 50 percent by volume) that has the predominant color. The Munsell color chart uses abbreviations to describe colors (e.g., 10YR 3/2). In the abbreviation, the last number indicates chroma; a chroma of 1 or 2 is considered low. Soils with a matrix chroma of 2 are usually considered hydric when mottles are present. Mottles are rust-colored spots or blotches in the soil formed by the oxidation of iron compounds via fluctuating water levels. Mottles found in soil with a matrix chroma of 2 or less often indicate that a soil is hydric.
- High organic content. Soil retains high levels of organic matter when saturation prevents decomposition over long periods allowing organic debris to accumulate. Organic content is considered high if the soil is composed of more than 20 to 30 percent (threshold differs depending upon other soil characteristics) organic material by weight in a layer at least 8 inches thick located in the upper 32 inches of the soil profile.
- Soils appearing on the hydric soils list. A list of hydric soils has been compiled by the USDA's National Technical Committee for Hydric Soils. Listed soils have reducing conditions for a significant portion of the growing season in a major portion of the root zone and are frequently saturated within 12 inches of the soil surface.
- Other hydric indicators. Other positive indicators of hydric soil include sulfide or "rotten egg" odor, aquic or peraquic moisture regimes, and the presence of iron or manganese concretions.

2.2.3 Wetland Hydrology

To determine whether a vegetation community has wetland hydrology, an area is examined for inundation, soil saturation, shallow groundwater tables, or other hydrologic indicators. An area in which soils are saturated to the surface for at least 2 weeks during the growing season (typically March 1 to

October 31 for low elevation areas in western Washington) meets the criteria for wetland hydrology. However, seasonal changes in water levels and the effect of recent precipitation events must be considered when evaluating an area's hydrology. Wetland hydrology can also be inferred from the presence of any of the following indicators: watermarks on vegetation, drift lines, sediment deposits, water-stained leaves, surface-scoured areas, wetland drainage patterns, and/or oxidized root channels.

2.2.4 Discrepancies Between Reconnaissance and Delineation

A wetland reconnaissance is defined as an investigation to estimate the location and extent of potential wetlands. Reconnaissance methods involve a survey of the entire site noting brief characterizations of vegetation, soils and possible wetland hydrology. Wetland determinations made during a reconnaissance level investigation are subject to change upon conducting a wetland delineation. A wetland delineation allows the opportunity to return to areas identified as potential wetlands in the reconnaissance visit and scrutinize the components further. Sample plots were placed in areas identified as wetlands in the reconnaissance.

2.3 WETLAND CLASSIFICATION

Wetlands are classified according to the Classification of Wetlands and Deepwater Habitats of the United States (Cowardin et al., 1979). Under the Cowardin classification scheme, wetlands and deepwater habitats are grouped into systems based on shared hydrologic factors. These systems are as follows: palustrine, marine, estuarine, riverine, and lacustrine.

The palustrine system includes all nontidal wetlands dominated by trees, shrubs, emergent herbaceous plants, mosses, and/or lichens, and all such wetlands that occur in tidal areas where the salinity due to ocean-derived salts is below 5 parts per thousand. Wetlands included in the palustrine system are those commonly referred to as marshes, swamps, bogs, fens, prairies, seeps, and intermittent ponds.

Palustrine wetlands are divided into classes by the dominant vegetation: Forested wetlands or forested wetland communities are dominated by trees or arborescent shrubs greater than 20 feet tall with at least 30 percent cover. Scrub-shrub wetlands or scrub-shrub wetland communities are dominated by woody shrubs less than 20 feet tall with at least 30 percent cover. Emergent herbaceous wetlands or emergent herbaceous wetland communities are dominated by nonwoody, vascular plants with at least 30 percent cover.

2.4 WETLAND FUNCTIONAL ASSESSMENT

URS Corporation assessed the performance of on-site wetland functions using the Wetland and Buffer Functions Semi-Quantitative Assessment Methodology (SAM) (Cooke et al. 1996). The sum of values assigned to a function's attributes produces a score for each wetland function assessed for each wetland. Functions that do not pertain to a given wetland were not evaluated.

Wetland functions are natural processes performed by wetlands that benefit their watersheds. Functions may be classified as hydrologic, biogeochemical, or biotic. More specifically, these functions are important for moderating surface water and stormwater flows, acting as recharge and discharge areas for

groundwater aquifers, maintaining the availability and quality of water, facilitating food chain production, and providing habitat for terrestrial and aquatic species.

2.5 WETLAND AND STREAM CLASSES AND BUFFERS OF KING COUNTY CODE

The King County Code (KCC) defines and regulates development impacts to sensitive areas, including wetlands and streams, in unincorporated areas of King County. URS has identified wetland and stream ratings for these sensitive areas on the site. These ratings are subject to verification by King County.

2.5.1 Wetland Ratings and Buffers

KCC identifies wetland classes based on specific criteria, and establishes stream and wetland buffer requirements, development standards, permitted alterations, and mitigation requirements. Definitions of wetland classes, mitigation, and other important definitions that pertain to wetland regulation are promulgated in the Technical Terms and Land Use Definitions section of the code (KCC 21A.06).

King County recognizes three classes of wetlands: Class 1, Class 2, and Class 3. According to KCC 21A.06.1415.A (Revised 1/95), a Class 1 wetland is one that has been assigned a Unique or Outstanding #1 rating in the 1983 King County Wetland Inventory, or that meets any one of the following criteria:

1. Supports state or federally listed threatened or endangered species or possesses "outstanding actual habitat" for those species.
2. Has 40-60% permanent open water in dispersed patches with two or more classes of vegetation.
3. Is 10 or more acres in size and has three or more wetland classes of vegetation, including permanently submerged vegetation in permanent open water.
4. Possesses plant associations of infrequent occurrence, such as bog or fen vegetation.

According to KCC 21A.24.06.1415.B, Class 2 wetlands are those assigned a Significant #2 rating in the 1983 King County Wetlands Inventory, or that meet any one of the following criteria:

1. Is greater than 1 acre in size.
2. Is equal to or less than 1 acre in size and has three or more classes of wetland vegetation.
3. Is located in an urban area, according to the King County Comprehensive Plan, is 2,500 ft² to 43,560 ft² (1 acre) in size, and contains three or more classes of wetland vegetation.
4. Is a forested wetland between 2,500 ft² and 43,560 ft² (1 acre) in size.
5. Has a heron rookery or raptor nesting trees.

A Class 3 wetland (KCC 21A.24.06.1415.C) is one that has been assigned the Lesser Concern #3 rating in the 1983 King County Wetlands Inventory, or that meets any of the following criteria:

1. Is equal to or less than 1 acre in size and has two or fewer classes of vegetation; or
2. Is located within an area designated as "urban" in the King County Comprehensive Plan, is between 2,500 ft² and 43,560 ft² (1 acre) in size, and has two or fewer classes of vegetation.

Buffer requirements for wetlands vary, depending on wetland classification and related functions and values. According to Environmentally Sensitive Areas code (KCC 21.A.24.320 as amended in 1997), Class 1 wetlands require a 100-ft buffer, Class 2 wetlands require a 50-ft buffer, and Class 3 wetlands require a 25-ft buffer. However, buffer requirements may be increased or decreased in some circumstances subject to approval by King County.

2.5.2 Stream Ratings and Buffers

According to KCC 21A.06.1240, streams are "those areas in King County where surface waters produce a defined channel or bed, not including irrigation ditches, canals, storm or surface water run-off devices or other entirely artificial watercourses, unless they are used by salmonids or are used to convey streams naturally occurring prior to construction in such watercourses." A stream is further defined as an area with a defined channel or bed that shows clear evidence of water passage but is not limited to bedrock channels, gravel beds, sand and silt beds, and defined channel swales. Streams may be perennial or intermittent. Three stream classes are defined by KCC as follows:

- Class 1 streams (KCC 21A.06.1240.A) are only those inventoried and identified as "Shorelines of the State" in King County's Shoreline Master Program (KCC Title 25).
- Class 2 streams (KCC 21A.06.1240.B) are smaller than Class 1 streams and contain perennial flow during years of normal rainfall or are those used by salmonids. Salmonids (21A.06.1015) are members of the fish family Salmonidae, including chinook, coho, chum, sockeye, and pink salmon; rainbow, steelhead, cutthroat, and brown trout; brook and Dolly Varden char; kokanee; and whitefish.
- Class 3 streams (KCC 21A.06.1240.C) have only intermittent or ephemeral flows during years of normal rainfall and are not used by salmonids.

Stream buffer requirements vary, depending on stream classification. According to KCC 21A.24.360 (revised 12/95), the minimum buffer requirements for Class 1, Class 2 salmonid, Class 2 without salmonids, and Class 3 are 100, 50, and 25 ft, respectively. Stream buffers shall be established from the ordinary high water mark or top of bank as appropriate and extend perpendicularly outward into the adjacent uplands (KCC 21A.24.360.A). In some cases, larger stream buffers are required, such as those adjacent to steep slopes, or where King County determines larger buffers are required to protect streams and aquatic resources.

3.0 RESULTS

3.1 PROJECT SITE HISTORY

The Lower Site has been mined for gravel intermittently for many years. Several gravel roads, rock piles, and cleared areas with no vegetation are located on this site. Soil in the area is compacted and/or comprised mostly of subsoil as a result of topsoil removal. However, a few patches of semi-mature, deciduous broad-leaved forest exist on the Lower Site.

SE Grouse Ridge Road extends approximately 2.5 miles from the gate located north of I-90. The road runs through second growth coniferous forest with some recently clearcut areas, deciduous forest, and mixed deciduous/coniferous forest. There is no history of mining in this area.

3.2 LANDSCAPE CONTEXT AND POSITION

Grouse Ridge is located between the Middle and South Forks of the Snoqualmie River. The ridge is comprised of an assortment of compacted till and outwash deposits. The top of Grouse Ridge ranges in elevation from 1,319 feet at the northernmost portion to 1,650 feet at the southeast portion. The Lower Site lies at the northwest base of Grouse Ridge at an approximate elevation of 693 feet. It lies on an outwash plain that forms a terrace that extends west to the town of North Bend. SE Grouse Ridge Road is located northeast of the Upper Site. This road is linked to I-90 to the south via Exit 38.

3.3 SOILS

According to the Soil Survey of Snoqualmie Pass Area, Parts of King and Pierce Counties, Washington (USDA, 1992), there are two major soil series groups in the study areas of the Lower Site: Winston loam, windswept; and Barneston gravelly sandy loam, windswept. Winston loam is considered well drained and found on outwash terraces and escarpments. Barneston is considered somewhat excessively drained and is found on terraces. Neither soil is identified as a hydric soil, but each contains an inclusion soil type that is listed as hydric. The Shalcar series is noted to be found in depressions within the Winston loam, windswept, series. Likewise, the Norma series is found in depressions within the Barneston gravelly sandy loam matrix. These inclusions are listed on the Hydric Soils List for Washington and on the United States list (USDA, NCRS 1997).

The soil survey identifies six major soil series along SE Grouse Ridge Road: Rober loam; Kaleetan sandy loam, windswept; Kaleetan sandy loam, till substratum; Nargar fine sandy loam; Marblemount gravelly loamy sand, 30 to 65 percent slopes; and Teneriffe loamy sand, 30 to 65 percent slopes. All but the Nargar series share similar characteristics included in the soil descriptions. They are considered well drained, found on mountain back slopes, and have a surface covered with a mat of needles, leaves and twigs that is 2-6 inches thick. Nargar fine sandy loam is also well drained, but is found on terraces and has a mat of needles, leaves and twigs only 1 inch thick. None of these soils, or any of their listed inclusions, are listed as a hydric soil on the state or national lists (USDA, NRCS 1997).

3.4 WETLANDS

3.4.1 NWI Information

The National Wetlands Inventory map of the Chester Morse Lake quadrangle shows one palustrine scrub-shrub, seasonally flooded wetland (PSSC) on the north side of SE Grouse Ridge Road. This wetland was confirmed by the delineation investigation and is identified as Wetland C. A detailed described of the Wetland C is found below. The map also designates the section of the Snoqualmie River where SE Grouse Ridge Road crosses it as riverine upper perennial, unknown bottom (R3OWH), habitat. The NWI map does not show any wetlands in the project vicinity of the Lower Site.

3.4.2 Reconnaissance and Delineation Investigation Discrepancies

The findings of the wetland reconnaissance conducted for the Lower Site were verified as accurate during the wetland delineation conducted on October 19, 2000. Wetland A is described in detail below. No additional wetlands were discovered in the Lower Site. However, discrepancies exist between the reconnaissance and delineation investigations conducted on SE Grouse Ridge Road. The delineation investigation discovered that some of the wetlands identified during the reconnaissance visit do not fulfill all the wetland criteria. Sample plots discovered non-hydric soils and upland vegetation dominance in five areas incorrectly identified as wetlands. These areas are described below in Uplands. Refer to Figure 4 in the Plants and Animals Technical Report for the wetland location on SE Grouse Ridge Road.

3.4.3 Lower Site Wetland – Wetland A

Wetland A was identified during the reconnaissance investigation and was confirmed by the second visit on October 19, 2000. This is the only wetland identified as wetland by the wetland delineation investigation in the Lower Site. It is located near the eastern boundary of the Lower Site (Figure 1). The wetland is roughly circular and approximately 0.38 acre. This wetland was characterized by Sample Plot 2 (SP-2).

This wetland is a palustrine forested wetland (PFO) that is dominated by broad-leaved deciduous trees. Dominant vegetation in SP-2 consists of a canopy of red alder (*Alnus rubra*, FAC) with an understory of salmonberry (*Rubus spectabilis*/FAC+) and youth-on-age (*Tolmiea menziesii*/FAC) as ground cover. Other species include black cottonwood (*Populus balsamifera* ssp. *trichocarpa*/FAC), trailing blackberry (*Rubus ursinus*/FACU), skunk cabbage (*Lysichiton americanus/*OBL), and Dewey sedge (*Carex deweyana*/FACU). In SP-2, the surface soil layer extends to 11 inches and is a black (10YR 2/1) clay loam. The lower layer extends below 18 inches depth and is an olive brown (2.5Y 4/3) sandy loam. Soil saturation was observed during the field visit and standing water in the sample pit rose to 13 inches depth 5 minutes after the pit was excavated. The wetland likely receives water from Stream 1 and Seep 2, both of which infiltrate entirely just north of the wetland boundary.

On the October 19th field visit, a circular area of standing water approximately 10 feet in diameter was present near the center of the wetland. Depth of standing water was 6 to 10 inches deep over a surface horizon of silty soil approximately 1 foot deep. Patches of inundation were also present within 25 feet of the south and west edges of the circular pool. The April 20, 2000 visit noted a shallow (<2 inches depth) layer of surface water flowing across much of the wetland, but infiltrating near the southwestern edge. The remaining area of Wetland A contains several downed moss-covered logs and a moderate cover of deciduous leaf litter over a muddy substrate. Subdominant plant species found in the wetland include slough sedge (*Carex obnupta/*OBL), sword fern (*Polystichum munitum*/FACU) and lady fern (*Athyrium filix-femina*/FAC+). Vine maple (*Acer circinatum*/FAC-) is rooted just outside the wetland border.

3.4.4 Upper Site Wetlands

No wetlands were found in the Upper Site. However, a number of small springs were found in this area. These springs are described in Plants and Animals section of the Final Environmental Impact Statement (FEIS).

3.4.5 Wetland along the SE Grouse Ridge Road – Wetland C

A sample plot (SP-3) was taken 0.5 mile northwest of the gate on the north side of SE Grouse Ridge Road and 25 feet west of Stream 2. The riparian area associated with Stream 2 was identified as Wetland A during the reconnaissance visit. However, during the delineation the vegetation was not considered to be hydrophytic and the soils were determined to be non-hydric. The dominant vegetation includes red alder, vine maple, salmonberry and trailing blackberry. Small amounts of several other species are found in the area, including western red cedar (*Thuja plicata*/FAC), red elderberry (*Sambucus racemosa*/FACU), youth-on-age, creeping buttercup (*Ranunculus repens*/FACW), and lady fern. The soils have a surface horizon that extends below 18 inches depth that is a very dark brown (10YR 2/2) gravelly sandy loam containing no redoxymorphic features. The soils were saturated to the surface at the time of investigation, but no free water was observed in the sample plot. Soil saturation was likely due to recent heavy rainfall. Some nearby low-lying areas were inundated from drainage from the roadside ditch.

The small riparian area bordering Stream 7 was identified as Wetland B during the reconnaissance investigation. The wetland delineation investigation found that the riparian areas adjacent to Stream 7 are not dominated by hydrophytic vegetation, do not contain any indicators of wetland hydrology, and therefore do not fulfill wetland criteria. The vegetation includes some hydrophytic species such as salmonberry and red alder, but also contains sword fern and Douglas fir (*Pseudotsuga menziesii*/FACU).

A sample plot (SP-7) was dug on the south side of SE Grouse Ridge Road in the area identified during the reconnaissance as Wetland C-1. Similar to SP-3, results did not find hydrophytic vegetation or hydric soils. The dominant species present are Douglas fir in the canopy with salmonberry in the understory. Ground cover is dominated by sword fern and Dewey sedge. Small amounts of red alder, reed canarygrass and giant horsetail are present in the area. The soils have a surface layer that extends below 18 inches that is a brown (10YR 4/3) silty loam. Soils were saturated to the surface and free water was present in the soil pit at 18 inches after 5 minutes. The delineation investigation determined this area to be an upland riparian area associated with Stream 10. Wetland C-2, on the north side of the road, was confirmed as wetland and was identified as Wetland C.

Wetland C is located on the north side of SE Grouse Ridge Road at approximately 1.4 road miles from the gate. This area is identified as a seasonally flooded palustrine scrub-shrub wetland (PSSC) on the NWI map. However, the wetland is dominated by deciduous, broad-leaved trees and would therefore qualify as a palustrine forested wetland (PFO). The wetland, which is less than 0.5 acre in size, encompasses the portion of Stream 10 located immediately north of the road, which lies upon a berm approximately 10 feet above the wetland surface. Although a 3-foot diameter culvert permits Stream 10 to flow south under the road, the berm appears to obstruct drainage sufficiently to produce semi-permanent inundation and saturation and accumulate a moderate amount of silt.

Characteristics of this wetland were observed in SP-6. Wetland vegetation is dominated by red alder in the overstory and salmonberry in the mid-story. Subdominant species present are Sitka spruce (*Picea sitchensis*/FAC), Pacific willow (*Salix lucida* ssp. *lasiandra*/FACW+), and Sitka willow (*S. sitchensis*/FACW). The herbaceous layer is dominated by reed canarygrass (*Phalaris arundinacea*/FACW) and Pacific water parsley (*Oenanthe sarmentosa*/OBL). Other species include skunk cabbage, American brooklime (*Veronica americana*/OBL), and soft rush (*Juncus effusus/*FACW).

Wetland C contains several other herbaceous plant species outside of SP-6 including, small-fruited bulrush (*Scirpus microcarpus*/FACW), tall mannagrass (*Glyceria elata*/FACW+), youth-on-age, lady fern, giant horsetail (*Equisetum telmateia*/FACW) and Dewey sedge. Understory species include thimbleberry (*Rubus parviflorus*/FACU), and trailing blackberry. Coniferous species include Sitka spruce and western hemlock (*Tsuga heterophylla*/FAC+).

The upper soil horizon extends to below 18 inches depth and is a very dark brown (7.5YR 2.5/2) loam. Unlike the soil found in the other sample plots, SP-6 soil contains high organic content and is subject to prolonged inundation. Due to surface water inputs from Stream 10, the soil in this wetland appears to be inundated and/or saturated for most of the year.

Surface water flows slowly through the wetland in small, braided channels that are not very distinctive. Standing water of various depths also exist within the wetland. The substrate underlying unvegetated patches where surface water is permanent or semi-permanent consists of silt and sand. Stream 10 was flowing at approximately 4 cfs at the culvert on the south side of the road. The portion of Stream 10 south of the road is described in the Section 2.2, Streams in the FEIS.

Sample plot 5 (SP-5) is located in the area previously identified as Wetland D. Similar to the previous sample plots discussed, SP-5 determined the area to be upland. Despite the abundant salmonberry and depressional topography, the combined vegetation and soils did not meet wetland criteria. The forest canopy is dominated by Douglas fir with salmonberry in the understory. Several other species contribute to the canopy, including black cottonwood, red alder, and western hemlock. The scant herbaceous layer contains lady fern, sword fern and youth-on-age. Soils have a surface layer that extends to 5 inches depth that is a brown (10YR 2/2) loam. The lower layer extends from 5 inches to below 18 inches and is a dark grayish brown (2.5Y 4/2) sandy loam. Neither horizon contains mottling or other redoxymorphic features. Soils were saturated at the time of investigation likely due to heavy rainfall in the previous week. Although the area is a topographic low spot, no wetland indicators were present in this area.

3.4.6 Uplands

Upland areas bordering Wetland A are characterized in SP-1. Vegetation in this area is not dominated by hydrophytic species. Facultative species including red alder and youth-on-age co-dominate with facultative upland species including big leaf maple (*Acer macrophyllum*/FACU) and sword fern. Subdominant species include a mix of hydrophytic and nonhydrophytic species including salmonberry, Douglas fir, and vine maple. The surface soil extends to 10 inches depth and is a black (7.5YR 2.5/1) loam. The subsoil is a very dark grayish brown (10YR 3/2) loam. The layers were not well defined and appear to have been disturbed by historical land use. The low chroma of the surface horizon indicates that the soil is hydric. The soil was moist, but not saturated during the field visit. Although hydric soil is present, this area is considered upland since hydrophytic species do not dominate the vegetation and wetland hydrology indicators are absent.

3.5 WETLAND FUNCTIONAL PERFORMANCE

King County Code (KCC) recognizes that the natural processes or 'functions' performed by wetlands include food chain production and habitat for nesting, rearing and resting sites for aquatic, terrestrial and avian species. Other beneficial functions include maintaining the availability and quality of water, acting

as recharge and discharge areas for groundwater aquifers and moderating surface and storm water flows (KCC 21A.06.1405).

The following section is the results of the functional assessment performed on the wetlands found within the study area using the Wetland and Buffer Functions Semi-Quantitative Assessment Methodology (SAM).

3.5.1 Wetland A

Although Wetland A is small in size, it has moderate to high performance for flood and stormwater control and moderate to high performance for support for base flow and groundwater. The wetland performs these functions well because it is located within the middle to upper 1/3 of the drainage, has a high amount forest cover and has depressional topography. The lack of upstream development and the wetland's ability to store water, along with the wetland vegetation structure and density, provides high water quality performance. Biological support and habitat functions of Wetland A are moderate to high because of habitat diversity and refuge, undisturbed buffers and habitat features. Cultural and socioeconomic functions are low due to minimal aesthetic values and passive recreational opportunities, and lack of historical or archeological resources and public access.

3.5.2 Wetland C

Although Wetland C is less than 1.0 acre in size, it exhibits moderate performance for flood and stormwater control and support for base flow and groundwater. The wetland performs these functions with moderate ability because it has a high amount of forest cover and has a semi-constrained outlet. This wetland has high water quality improvement because of the lack of upstream development, slow flows through the wetland, the ability to store water, and dense vegetative cover. Biological support and habitat functions are moderate because of the small size, moderate habitat diversity and refuge, disturbed buffers (i.e. adjacent roadway) and moderate number of habitat features. Cultural and socioeconomic functions were also rated low for this wetland since it has low aesthetic value, lacks cultural or historical resources, lacks recreational activities, and is not connected to open space.

3.6 WETLAND RATINGS AND BUFFERS

Wetlands A and C are considered Class 2 wetlands according to the criteria described in KCC 21A.06.1415, which is reiterated in the Methods section of this report. Since these wetlands do not provide habitat for endangered, threatened, sensitive, or priority species, do not possess any plant associations of infrequent occurrence, do not possess any permanent open water, are each less than 10 acres in size, neither are considered Class 1 wetlands. Since these wetlands are each less than 1 acre in size, possess 3 vegetation classes, and contain forested wetlands, each is considered Class II wetlands.

According to KCC 21A.24.320, Class 2 wetlands typically require a 50-foot wide buffer. The buffers shall be measured on a horizontal plane from the wetland edge and will be kept in a natural condition. Designation of buffer areas is intended to protect wetland functions.

Additionally, both these wetlands are considered non-isolated wetlands according to the King County Code. As indicated in KCC 21A.06.1410, non-isolated wetlands located outside Urban Area boundaries

are defined as wetlands greater than or equal to 2,500 ft^2 and not hydrologically connected with streams or other wetlands greater than or equal to 2,500 ft^2. Both Wetland A and Wetland C are greater than 2,500 ft^2 in size and are therefore non-isolated. Additionally, Wetland A is hydrologically connected to Stream 1 of the Lower Site and Wetland C is hydrologically connected to Stream 10.

3.7 STREAMS

Information about fish bearing and non-fish bearing streams in the proposed project area can be found in the Section 2.2, Streams and Section 2.4, Potentially Affected Fish and Wildlife Species in the FEIS. This includes the twelve streams crossed by SE Grouse Ridge Road. Streams associated with wetlands identified during the wetland delineation are described below. This includes one stream and one seep located in the Lower Site.

One stream and one seep run approximately parallel to each other flowing in a southwesterly direction near the northeastern corner of the Lower Site. The stream and seep are approximately 80 feet apart. Both the stream and seep are ephemeral and infiltrate entirely before reaching a downstream waterbody. The area immediately downslope of the stream and seep is a moist deciduous forest dominated by red alder. Immediately south of the red alder forest is the wetland found at the Lower Site (Wetland A).

3.7.1 Stream 1

Stream 1 extends from outside of the project boundaries southwest to the northeastern corner of the Lower Site. The stream enters the project boundaries on a steep slope with a southwesterly aspect. The upper 50 feet of the creek channel is on an approximately 80 percent slope and travels through large boulders and some Himalayan blackberry (*Rubus discolor*/FACU) with a few small native trees and shrubs. On the lower portion of the stream, the slope decreases to 40 percent before infiltrating underground. A dense thicket of Himalayan blackberry dominates the vegetation for approximately 70 percent of this area. The lowermost 30 percent of the lower portion of the stream is dominated by semi-mature red alder and vine maple.

Surface water was flowing over a 20-foot length in the upper portion of the stream channel. Less flow was observed during the investigation of October 19, 2000 in comparison with the wetland reconnaissance on April 20, 2000 due to seasonal differences in runoff that are typical for streams of the region.

Stream 1 is a Class 3 stream according to KCC 21A.06.1240.C because it has only intermittent or ephemeral flows during years of normal rainfall and is not used by salmonids. A Class 3 stream has a minimum buffer requirement of 25 feet (KCC 21A.24.360.A).

3.7.2 Seep 2

Seep 2 was originally characterized as Stream 2 during the April 20, 2000 investigation. The April investigation when the seep was originally labeled a stream was conducted during a time of maximum runoff from snowmelt, causing the seep to flow for only a short time. The visit on October 19, 2000 found that the seep did not exhibit characteristics of a stream according to the definition of streams in KCC 21A.06.1240. This definition requires stream to have a defined channel or bed that demonstrates

clear evidence of water passage. Instead, the channel observed in the seep is not well defined. Flowing water appeared to occur as sheet flow across a wider area surrounding the area originally labeled as Stream 2. The seep substrate is comprised of leaf litter from the deciduous, broad-leaved forest. This substrate is not very different from the surrounding forest floor. Vegetation is dominated by red alder in the canopy, vine maple in the mid-story, and sword fern in the understory.

4.0 IMPACTS AND MITIGATION

Impacts associated with the project activity under consideration will be mitigated by applying the commonly accepted mitigation sequence as follows: avoidance, minimization, rectification, and compensation.

Avoiding impacts. Impacts to wetlands will be avoided by locating most construction, including the creation of a freshwater storage pond, outside of delineated sensitive areas including wetlands, streams, and buffers.

Minimizing impacts. Unavoidable impacts to wetlands will be minimized by locating construction zones outside of wetlands and wetland buffers. In addition, Best Management Practices (BMPs) will be used during construction to prevent the discharge of fill material in wetlands and streams.

Rectifying impacts. Any unintentional, unauthorized impacts to sensitive areas that may occur during construction will be repaired and rehabilitated as appropriate. Temporarily disturbed areas can be reverted to pre-construction conditions if impacts are not very extensive.

Compensating impacts. Unavoidable impacts to wetlands will be compensated by enhancing wetland areas that will not be directly impacted by the proposed construction and are within the same sub-basin as the impacted wetlands.

If impacts to onsite wetlands prove to be unavoidable then mitigation for these unavoidable impacts will adhere to King County mitigation requirements outlined in KCC 21A.24.340. Accordingly, alterations of Class 2 wetlands must be replaced or enhanced on the site or within the same drainage basin on a 2:1 basis (replaced or enhanced wetlands: impacted wetlands). The final result of replacement or enhancement after wetland alteration has occurred will provide a net gain of biologic and hydrologic functional performance.

4.1 ALTERNATIVE 1 – NO ACTION

There are no wetland impacts and thus no mitigation is associated with this alternative.

4.2 ALTERNATIVE 2 – PROPOSAL: LOWER AND UPPER SITES MINING - EXIT 34

The freshwater storage pond to be constructed in the Lower Site will avoid impacts to Wetland A and the stream and seep located on the Lower Site. Mitigation for pond construction will likely be in the form of avoidance. Impacts to Wetland A, the stream, and the seep will likely be avoided by situating the pond away from these areas and their buffers. Since both the wetlands (Wetland A and Wetland C) onsite are

non-isolated wetlands according to KCC 21A.06.1410 and impact avoidance is apparently feasible, direct impacts to these areas from building construction or landscape modification will not likely be permitted by King County.

Since SE Grouse Ridge Road will not need to be widened for this alternative, no impacts or mitigation will occur for Wetland C.

4.3 ALTERNATIVE 2A – UPPER SITE MINING AND LIMITED LOWER SITE MINING – EXIT 34

Wetland impacts and mitigation under this alternative will likely be the same for Alternative 2 – Proposal.

4.4 ALTERNATIVE 3 – LOWER AND UPPER SITES MINING – EXITS 34 AND 38

Impacts and mitigation for Wetland A under this alternative are the same for Alternative 2 – Proposal. Widening SE Grouse Ridge Road will avoid impacts to Wetland C, located just north of this road. The wetland is adjacent to the road shoulder for approximately 50 lineal feet. Mitigation for road widening will be in the form of avoidance

4.5 ALTERNATIVE 3A – UPPER SITE MINING AND LIMITED LOWER SITE MINING – EXITS 34 AND 38

Wetland impacts and mitigation under this alternative will likely be the same for Alternative 3 – Lower and Upper Sites Mining – Exits 34 and 38.

4.6 ALTERNATIVE 4 – UPPER SITE MINING - EXIT 38

Since the freshwater storage pond will not need to be constructed on the Lower Site for this alternative, no impacts or mitigation will occur for Wetland A. Impacts and mitigation for Wetland C under this alternative will likely be the same for Alternative 3 – Lower and Upper Sites Mining Exits 34 and 38.

5.0 REFERENCES

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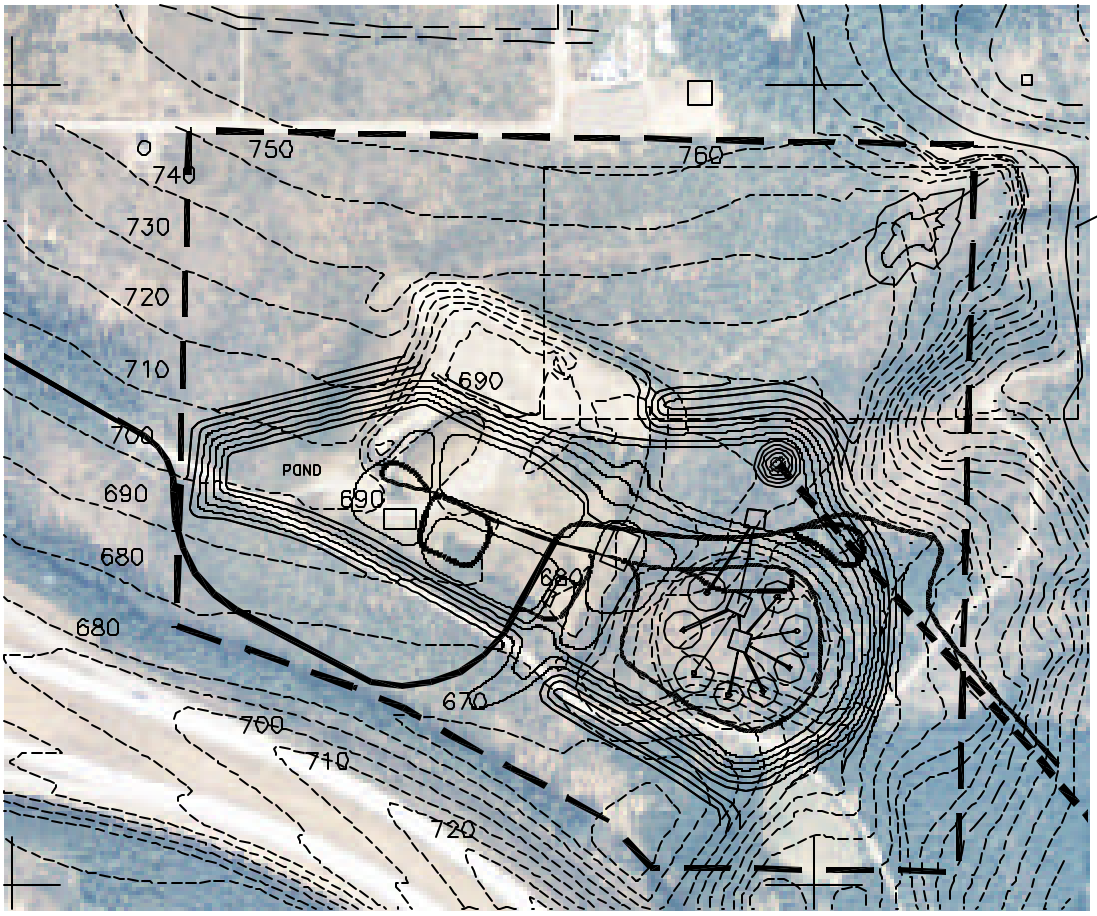

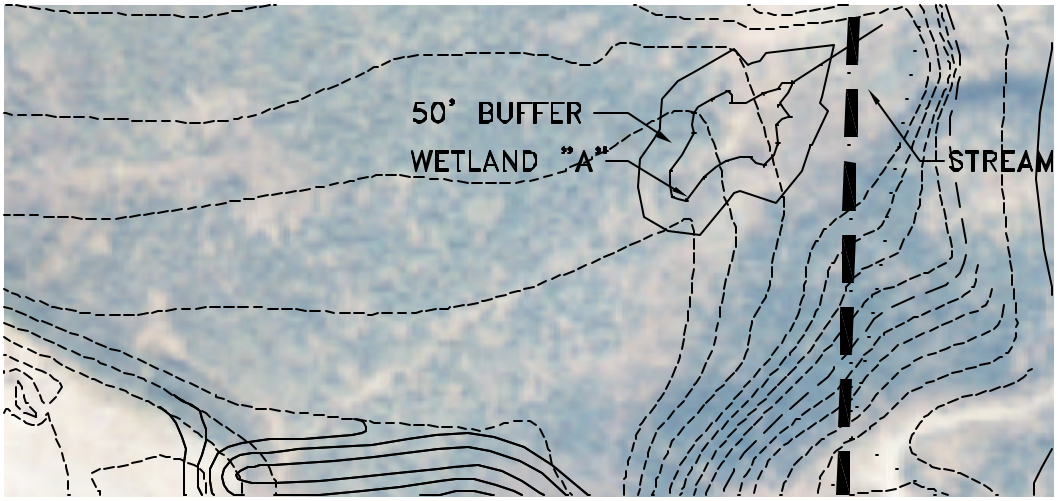

DETAIL

Figure 7-5
EXISTING WETLAND LOCATION
LOWER SITE

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North Bend Gravel Operation FEIS
North Bend, Washington

APPENDIX E

WETLAND DELINEATION FIELD DATA FORMS

The information contained in this Appendix is on file with King County.

APPENDIX F

WETLAND AND BUFFER FUNCTIONS

SEMI-QUANTITATIVE PERFORMANCE ASSESSMENT

The information contained in this Appendix is on file with King County.